vol. II no. 3

November, 1942

School Shop

FOR INDUSTRIAL ARTS & VOCATIONAL EDUCATION TEACHERS

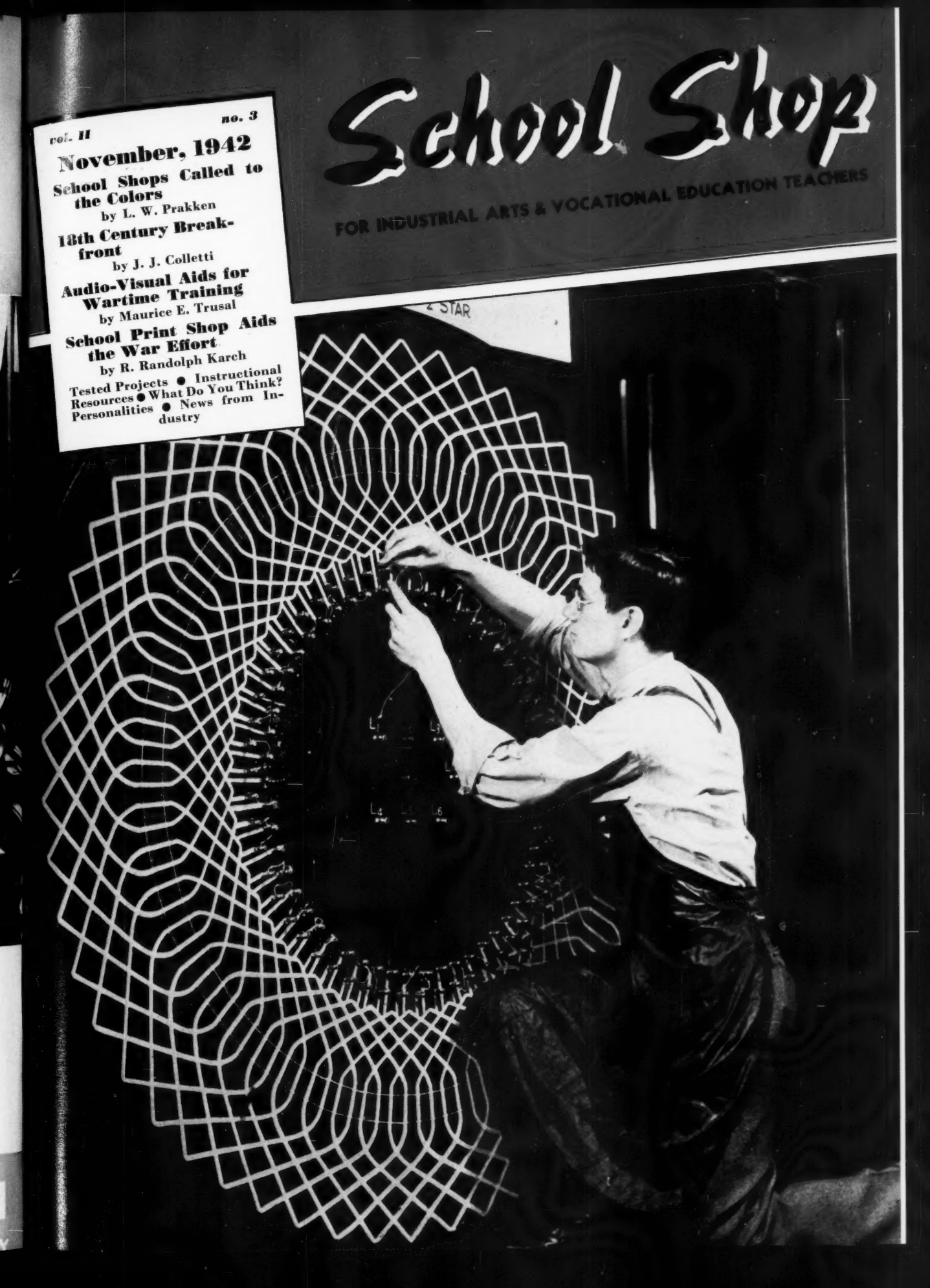
School Shops Called to the Colors
by L. W. Prakken

18th Century Breakfront
by J. J. Colletti

Audio-Visual Aids for Wartime Training
by Maurice E. Trusal

School Print Shop Aids the War Effort
by R. Randolph Karch

Tested Projects ● Instructional Resources ● What Do You Think? Personalities ● News from Industry



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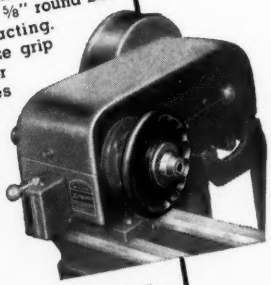

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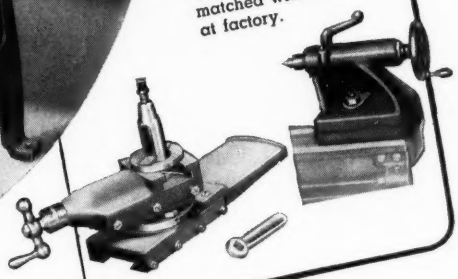

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School Shop

FOR INDUSTRIAL ARTS & VOCATIONAL EDUCATION TEACHERS

CONTENTS

November, 1942
Vol. II, No. 3

School Shops Called to the Colors. Lawrence W. Prakken 3
School shops asked to play leading role in pre-induction training.

A Teaching Aid for Blueprint Reading. Andrew J. Miller 5
An invaluable device for developing the ability of visualization.

Project of the Month: An 18th Century Breakfront. J. J. Colletti 6
This beautiful cupboard-secretary will draw out the finest cobinet-making ability of your students.

Shop Training for Victory: Audio-Visual Aids for Wartime Training. Maurice E. Trusal 8
How the intelligent use of visual aids increases the quantity and improves the quality of workers trained for war industries.

TESTED INSTRUCTIONAL PROJECTS—
These projects have all been tested in school situations and found useful in shop teaching.

Adjustable Wrench. Glen Christy 11
Combination Stool and Stepladder. H. O. Akeson 12
Adjustable Jig for Cutting Dowels. I. M. Fenn 13
Brazing Band-Saw Blades. Milton Schrag 13

In the Morning Mail 14
Comments and questions from readers.

A School Print Shop Aids the War Effort. R. Randolph Karch 16
How Cincinnati Printing High School helped boost stamp sales to more than $11,000 weekly in the Cincinnati schools.

News from Industry 18
New products, new equipment, industrial advancements.

News 19
Items concerning the school shop world.

Strictly Personal 19
About your fellow teachers.

Instructional Resources: Books, Pamphlets, and Visual Aids 20
Listings in easy form for clipping and filing.

Building a New Vocation: Technical Radio. K. L. Dragoo 22
How Gompers Trades School, San Francisco, provides professional radio training for the Army Signal Corps.

Washington Letter. Ben Brodinsky 24
News from the Nation's Capital of particular interest to shop teachers.

Index to Advertisers 24

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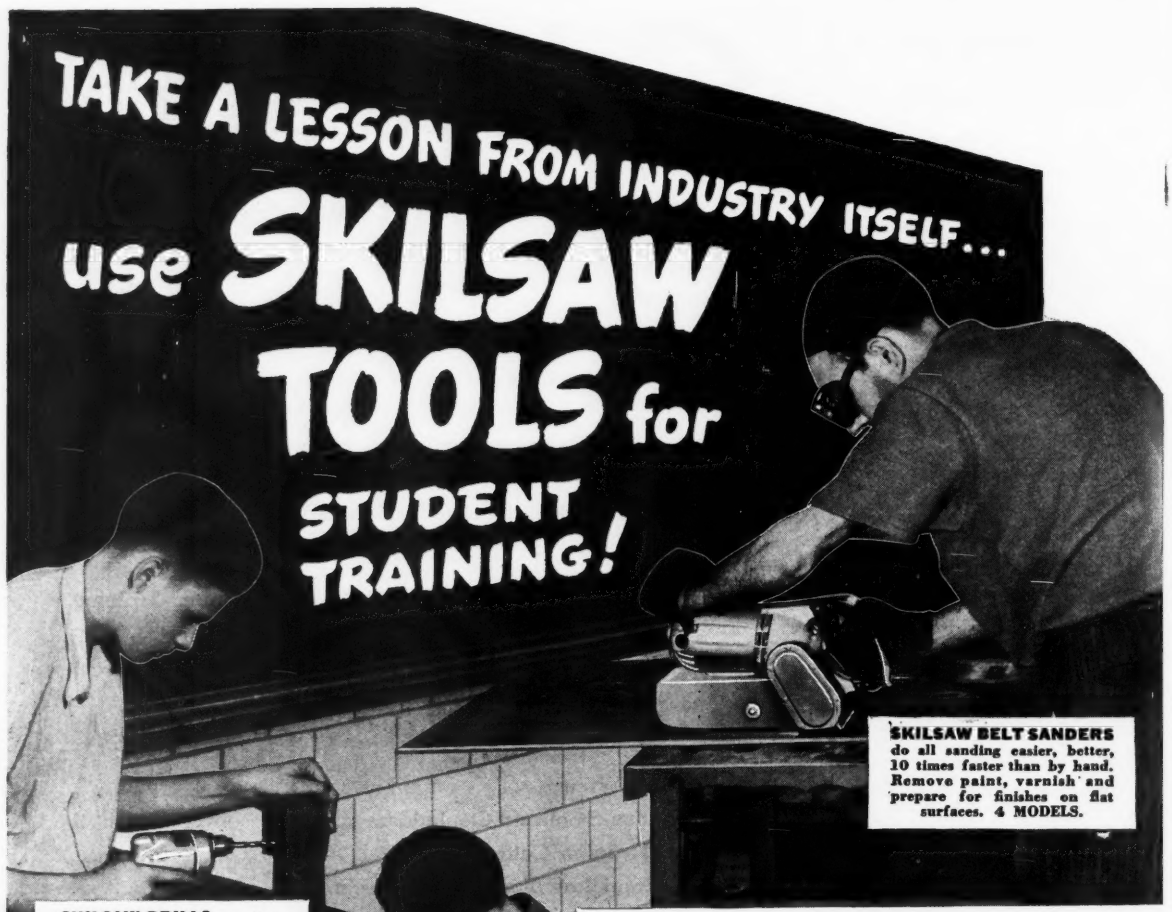

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School Shops
Called to the Colors

The Army Asks for Pre-induction Courses

By *Lawrence W. Prakken*
EDITOR, SCHOOL SHOP

Victory Corps Insignia—top row: Land Service, General Membership, and Sea Service; second row: Production Service, Community Service; bottom row: Air Service.

THE phrase, "These are historic times," has been repeated to the point of boredom whenever the war is mentioned yet those four words apply without reservation to the part to be played by school shops and their teachers in the war effort. Here is the situation.

Lieutenant General Brehon B. Somervell has stated the Army viewpoint as follows: "There must be an all-out effort on the education front. Let us be realistic. Every able-bodied boy is destined at the appointed age for the armed services. The tempo of war is such that a complex college education is impossible. Those able to go to college must devote this time to training for the specialized work which the services demand. Those who do not or cannot go to college must begin now, whether they're in school or out of school, to prepare themselves for the tasks which are for them inevitable and unavoidable."

The Army is inducting hundreds of thousands of men every six-month period. Most of them come from occupations and activities utterly foreign to the conduct of a war. As everyone well knows, a modern army is an army of specialists. Few men who are inducted are specialists in fields applicable to Army occupations. For those few who are trained, the Army is grateful. But, and a big "but" it is, the trained inductees are pitifully few in number. The obvious result is that the Army is faced with a staggering problem of training because out of every 100 men inducted into the service, 63 are assigned to duties requiring highly specialized training and the others make better soldiers if they are trained in some special skill. General Marshall has indicated to Congress that the Army will be almost doubled in numbers in the next few months. A total of approximately three and a half million more men will be called to the colors soon. If 63 percent of them require highly specialized training, it means that 2,205,000 men will go through the program in the next few months.

The Army has called on the schools for help in this tremendous undertaking. Here is what has happened. The Army has set up a Pre-induction Training Section in the Civilian Personnel Division, with Merwin M. Peake as chief. Working in collaboration with the U. S. Office of Education, this office has studied extensively the various Army technical and field manuals used for the training of personnel. This study disclosed that there are over 600 Army occupations of a special or technical nature the fundamentals of which could be given in seven different courses:

Radio students at New York City's High School of Science.

1. Fundamentals of Electricity.
2. Fundamentals of Machines.
3. Fundamentals of Shopwork.
4. Fundamentals of Radio.
5. Fundamentals of Automotive Mechanics.
6. Code Practice and Touch Typing.
7. Radio Maintenance and Repair.

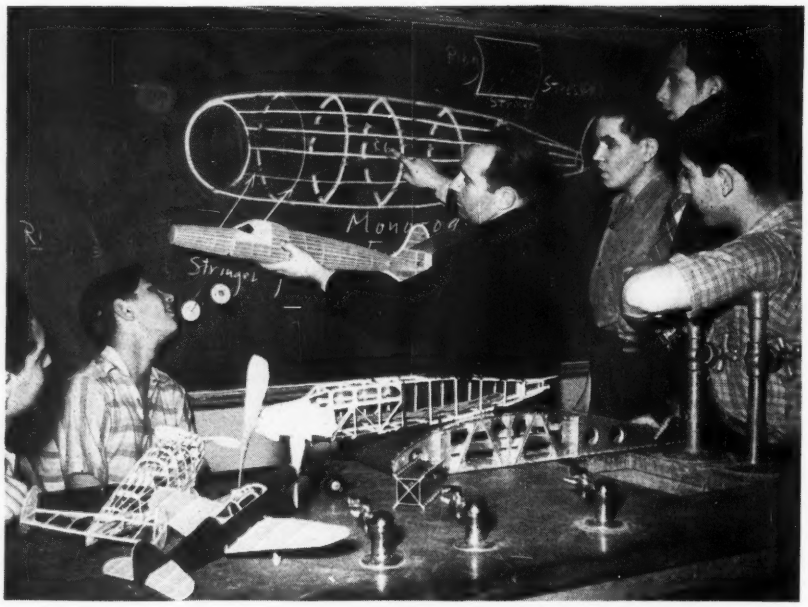
In the words of Mr. Peake, "More than 150 jobs in the Army require knowledge of electricity. More than 225 jobs require mechanical ability or knowledge of machines. The Fundamentals of Electricity is a 90-period course. Another 180 periods must be spent in learning the Fundamentals of Radio. The Army can't wait that long after a man has put on his uniform. Our schools can provide this training, thereby freeing the Army to concentrate on combat application of technical specialties of war."

The Army is asking, nay begging, the schools to offer these courses *now!* Not only does it want every high-school student to have taken one or more of these courses before leaving school, but it wants the schools in evening and part-time classes to give every prospective out-of-school inductee an opportunity to go to class so that he will have a head start when he is inducted.

Course outlines have been prepared for each of the seven courses listed above. Copies of them may be secured from the U. S. Office of Education, Washington, D. C. The first three, Fundamentals of Electricity, Fundamentals of Machines, and Fundamentals of Shopwork, are on the foundational level. These are courses containing fundamental elements of Army technical training and are meant for the 80 or 85 percent of boys in and out of school who constitute a reservoir of potential trained manpower. The other 15 or 20 percent can secure excellent background from war-enriched courses in physics and mathematics for continued specialization at the college level. They will constitute the reservoir from which many of our officers will be drawn.

Shop teachers will be asked to teach a number of these courses. A brief note on each of them will be given here.

Fundamentals of Electricity is a foundation course which the Army considers as prerequisite to work in radio, aviation, mechanics, and allied special-



Preflight class studying fuselage construction at High School of Science, New York City, Dr. A. Joseph, instructor.

ties. The course consists of 13 units, providing material for one semester's work. It is not manipulative in character but is designed to give background understandings.

Fundamentals of Machines is a physics course adapted for Army training purposes largely from the areas of mechanics and heat. It is a one-semester course which will be offered largely by science teachers.

Fundamentals of Shopwork will be the big responsibility of teachers of industrial arts and vocational education. It is designed to give much-needed training in the use of hand and machine tools. *It is basic to more Army occupations than any other single pre-induction course!* The course is based on 90 periods of instruction or one semester, but the Army recommends that students be given at least two semesters of shopwork.

Fundamentals of Radio is a two-semester course of a beginning specialization nature. It is based on 18 topics and includes laboratory exercises and demonstrations. Many shop teachers will be asked to conduct this course.

Fundamentals of Automotive Mechanics is a two-semester course intended to give an insight into the fundamentals concepts involved in an understanding of the operation, maintenance, and repair of a motor vehicle. It is based on nine fundamental topics with some time devoted to laboratory exercises. A shop teacher should have no difficulty in teaching this course. Other teachers with a science background and some knowledge of automotive mechanics should also be able to teach the course.

Radio Maintenance and Repair is a course designed to furnish a considerable degree of operational skill. It can be offered by technical and vocational high schools, as well as by many general high schools with the equipment and teaching personnel to carry on an advanced course.

Code Practice and Touch Typing is a course at the operational level designed to teach Morse code. A kit including phonograph records and instructional devices has been made up so that inexperienced teachers can give the course.

These various course-of-study outlines have been prepared as suggestions by the Army and Office of Education. Teachers may alter them to fit their needs and facilities. The courses should be given with application to Army manuals in mind, however. Each course outline includes the names and numbers of the Army manuals on which it is based so that teachers may secure the manuals for class use.

The Army asks that every junior and senior in high school have at least one period a day devoted to what could be considered pre-induction training. Students already enrolled in technical courses of a similar nature need not change their programs, of course.

Schools everywhere have accepted the responsibility. New York City is requiring every high-school student to take at least one period a day of pre-induction work. Highland Park, Michigan, has done likewise as have many other systems. Frequently first-semester curriculums have been completely revised by schools to make adjustments for the courses.

The preflight training program is essentially a part of pre-induction training although organized ahead of the courses listed above and carried on under the auspices of a separate agency of the government. Most schools are not asking that students in preflight also take the other pre-induction courses unless they wish to.

Victory Certificates will be awarded students who successfully complete a pre-induction course. It will accompany them to the Army Reception Centers where it will be used as evidence in making assignments.

The High-School Victory Corps program involves as one of its objectives the inclusion of all students in pre-induction training. The manual describing this program can be secured from the Superintendent of Documents, Washington, D.C., for 15 cents.

And now a word about the girls. Federal and Army officials would like every girl to take one or more of the preinduction courses too, because women are playing an increasing part in war industry and in noncombatant service with the armed forces.

If the schools respond to this call for help—and every indication is that they will with vigor—industrial education will receive the greatest impetus it has ever had in its history. We must make good. Parenthetically it might be added that the war is making blue shirts and slacks socially acceptable.

Front Cover . . .

Student winding an armature at the Cass Technical High School, Detroit, where about 600 day and evening students take this course.

A Teaching Aid for Blueprint Reading

BY *Andrew J. Miller*

The author has used this special teaching device with classes in blueprint reading for a number of years and found it invaluable in developing the art of visualization in students. Mr. Miller is Assistant Director of Research, Pittsburgh, Penna., Schools and Instructor in Vocational Teacher Training, University of Pittsburgh.

BLUEPRINT reading has to do with the interpretation of working drawings by the skilled mechanic. Assuming that the blueprint, or working drawing, gives full and complete information about the object represented, the workman is supposed to be able to build up a mental image of the object which will correspond in every respect to what the engineer, inventor, or draftsman had in mind. To be able to read blueprints, the workman should not only be able to visualize the object represented, but he must also possess a knowledge of and be able to interpret dimensions, notes, specifications, and conventional representations employed in working drawings. Of the two abilities mentioned above, the power of visualization is probably the most important and also the most difficult to teach. The purpose of this paper is to describe a device which the writer has found particularly useful in the development of visualizing ability.

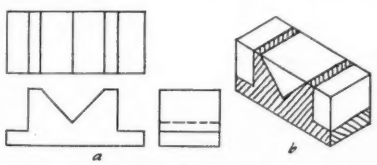


Fig 1 V Block

Figure 1 at *a* shows a three-view working drawing of a V-block. A pictorial view of the V-block as drawn on a block of wood is shown at *b*. The steps in drawing the shape of the object (shown by the working drawing) on the block of wood are as follows:

1. Select a block of wood of approximately the same proportion as the object represented by the working drawing or blueprint. Some material other than wood may, of course, be used for this purpose. Since, as will be explained later, the working drawings used at the beginning stages of the blueprint reading course used by the writer are not dimensioned, the size of the block used is of minor importance.

2. Draw lines corresponding to the shape of the object on the various surfaces of the block. In the drawing of many of these lines the finger-gage method may be used.

3. Fill in or shade the surfaces in order to bring into clear relief the shape of the object shown in the drawing.

The advantages of this method of approach are:

First, it aids the learner in the process of visualizing the object. For the beginner, visualization is a slow, evolutionary process. From a repeated examination and comparison of the various views of the working drawing, the exact shape of the object represented evolves gradually in the mind of the learner. This gradual

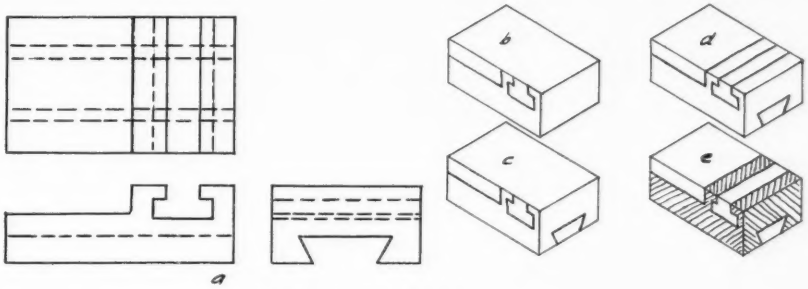


Fig 2 Compound Rest

evolution of the idea is illustrated in the four pictorial drawings, *b*, *c*, *d*, and *e* of Figure 2.

Second, it provides a simple method by which the learner can show or demonstrate to the instructor that he (the learner) does have a clear conception of the shape of the object. It should be added that while the shape of a large number of machine parts can be clearly

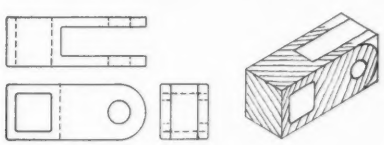


Fig 3 Link

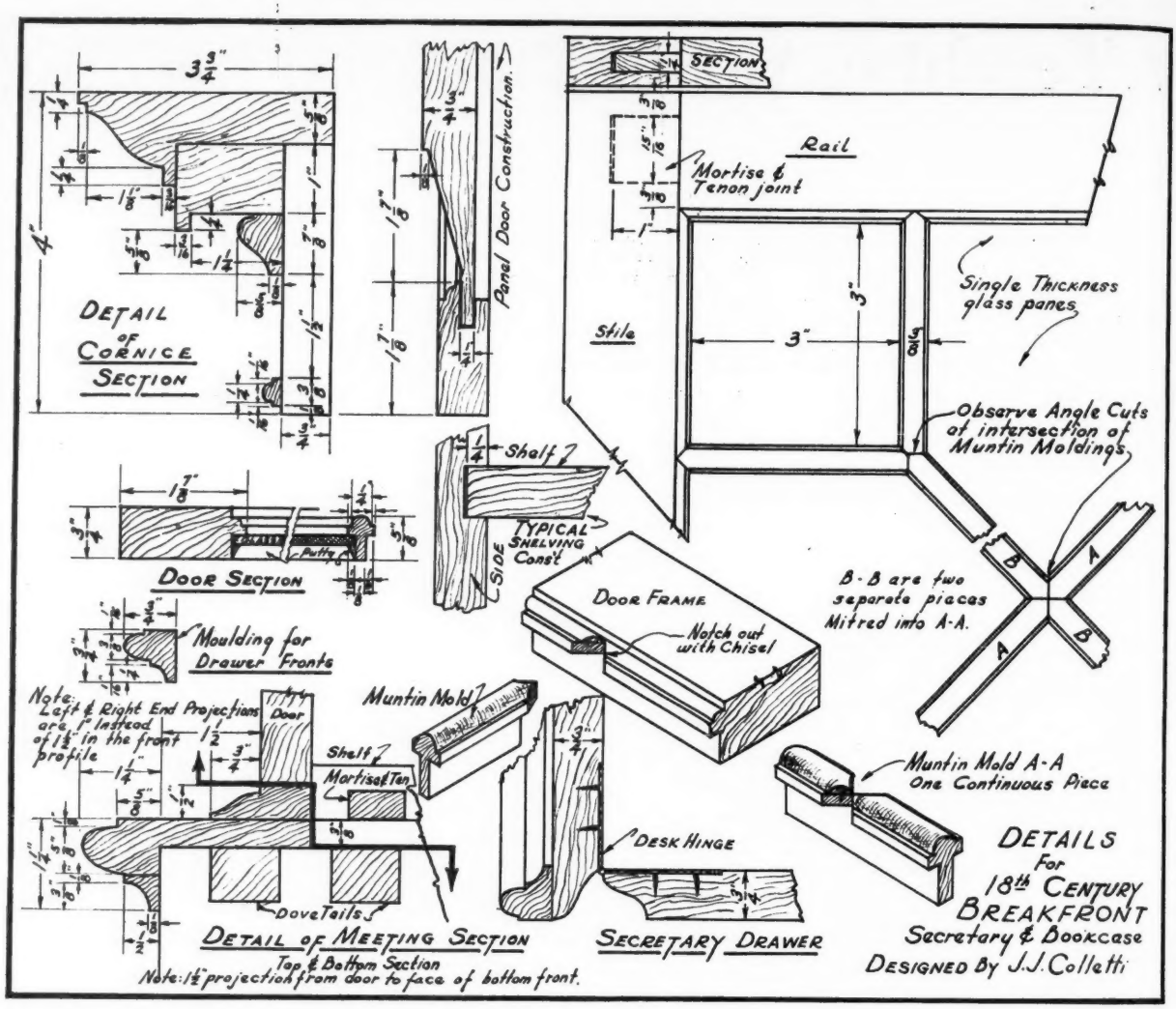
and completely shown by the use of this method, there are others in the case of which some additional word-by-mouth explanation must be made by the learner as he presents his work for the instructor's approval. Such an object is shown in Figure 3.

Third, it conserves the time of both learner and instructor. By providing an assortment of blocks (half dozen or more) of varying proportions for the use of each learner, a number of the assigned problems may be solved without calling on the instructor for help or for the purpose of having the work checked and approved by him. For example, after presenting a new type of problem or principle, the instructor usually assigns a number of problems for solution. By the use of this device the solution of all assigned problems may be worked out by each individual in class, or if sufficient time is not available, may be completed as a home-work assignment.

In using the device just described, it has been found advantageous to eliminate all reference to size or dimensions from the drawings used at the beginning stages of the work, because it enables the learner to concentrate his entire attention on the shape of the object.

Needless to say, the use of the device assumes the availability of the well-organized blueprint course. At the beginning of such a course the learner will probably be called upon to deal with drawings or simple objects, all of whose surfaces are parallel to the three planes of projection. Following this he might be progressively introduced to drawings of objects containing sloping surfaces, hidden lines or surfaces, cylindrical or conical parts, auxiliary and sectional views, etc.

Blocks of wood of the kind used in this work may be found in the scrap box of any cabinet-making or wood-working shop. If in addition the drawing room is equipped with a bench-hook, cabinet maker's square, and back saw or better still, a wood-working bench and plane, the learner can cut his material to the approximate size and proportion needed. The lines on the blocks may be drawn with pencil or chalk which may be erased.



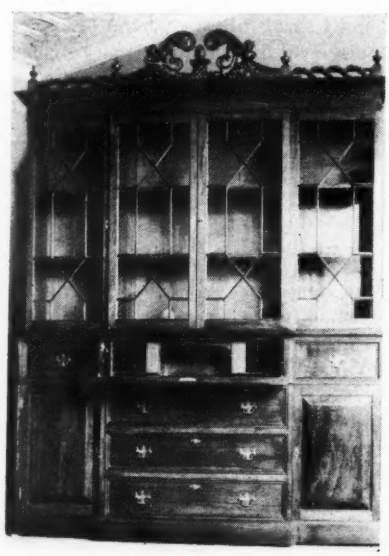
PROJECT OF THE MONTH:

An 18th-Century Breakfront

BY ***Jack J. Colletti***

CONSTRUCTION of this eighteenth-century breakfront is a task to be undertaken only by the serious student of cabinet-making. Successful construction of it will label its maker as a fine craftsman. And yet, it is not so difficult that the woodworking student cannot accomplish the many woodworking skills and technics involved with proper guidance from the instructor.

The interior decorator's major problem seems to have become the selection of furniture which will be both eye-appealing, proportionate to the size of the room, and useful for many purposes. It is perhaps for this reason that the breakfront has achieved widespread popularity as a living-room piece. Here is a unit ideally suited to apartments limited in dimensions, one which integrates the uses of a living room which is at once a reception room, a library, a music room, and an auxiliary dining room.



In addition to serving a practical purpose, the breakfront, like a baby grand piano or a fireplace, offers admirable possibilities to the decorator for its placement in a center-of-interest spot, around which can be built the rest of the room's furniture. On the other hand, it may be used in conjunction with a large piece, and still hold the ground, if not the major interest.

In the construction of a piece of furniture of this kind, it is essential that all parts be rigidly and permanently

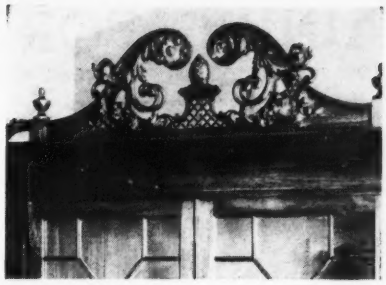
A professional project calling forth the utmost skill of the student and calling for practice in all the manipulative technics he has learned. Jack J. Colletti teaches architectural drawing at Gompers High School, Bronx, N. Y.

joined to insure the retention of its original shape. This is particularly true for bookcases having spans over 3'-6". Careless or improper joining of parts leads only to sagging shelves, tilting or bulging sides. In addition, it must be planned so that it will be easily portable if another spot in the room is wanted for it. Constructing it in sections, then, would facilitate the handling and subsequent placement.

In the design of the eighteenth-century breakfront, the minute details of cornice profiles and projections, as well as the general mass proportions of the pieces as a whole, should be carefully studied and followed as closely as possible when all mouldings and members are to be cut by hand.

If the making of mouldings is impossible or impractical for the craftsman or amateur, stock mouldings that closely correspond in appearance and measurements to the ones given for the breakfront herein described should be used. Extreme care must be taken in the latter step if the individual is interested in maintaining faithfulness to design.

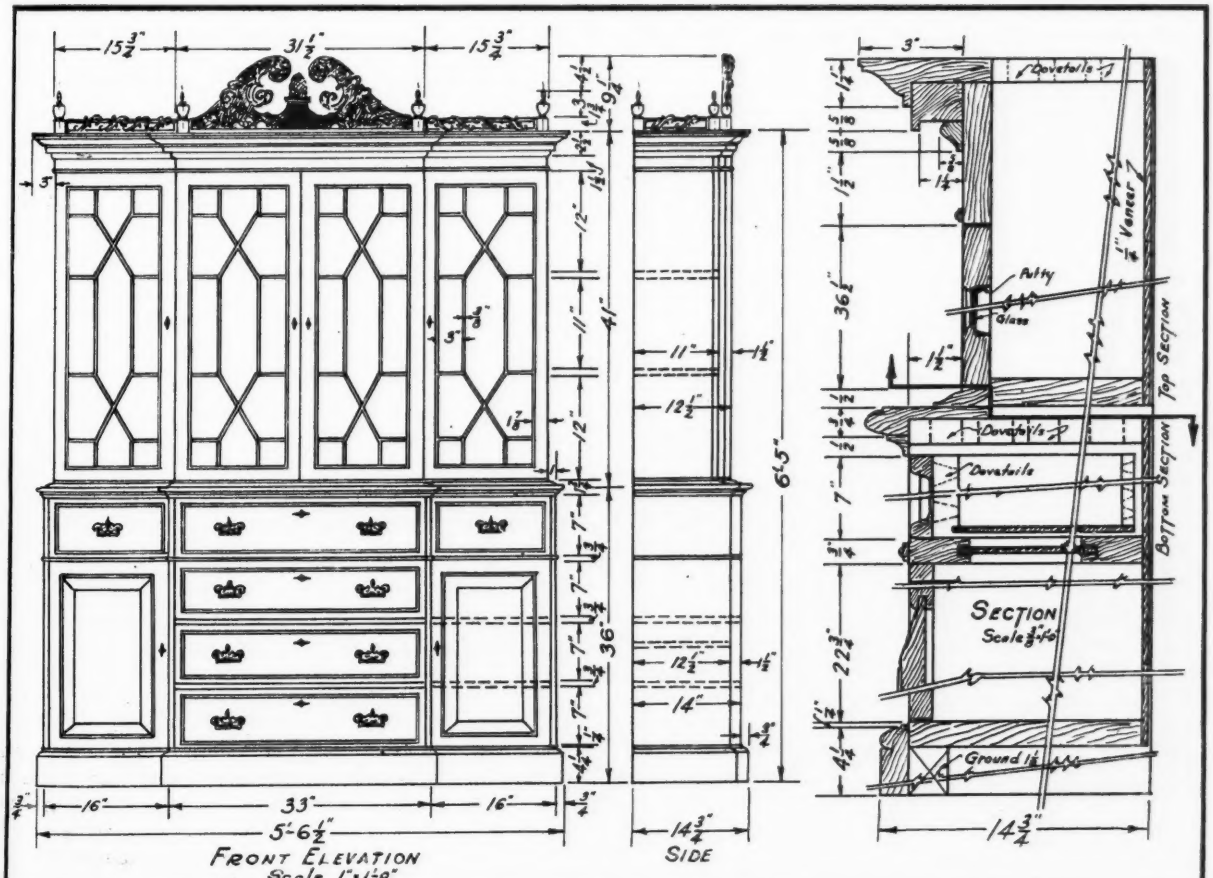
Finally, the pediment and parapet crowning the breakfront are optional. Their inclusion on the piece would depend on the ability of the worker to do a carving job. Since this is generally beyond the reach of the amateur it is suggested by the author that it be treated as a separate project at some later date.



Closeup of the pediment. This and the parapet on either side may be left off or added as a later project, since they call for considerable carving skill.

Since most hard woods are sold in random lengths and widths it is impossible to prescribe any specific sizes that should be bought. However, in studying the sketches and details of the breakfront a minimum width of 10¼" at the upper outside sections, and a maximum width of 14" at the bottom outside sections will be found. These dimensions, together with those given in the sketches, should be noted, and referred to and considered in the selection of the material, if any choice in width or length of lumber is available. If the lumber is purchased in the rough and is 1" full, ask to have it dressed to ⅞". The company from which it is bought will be glad to do this as the price per foot is usually given for dressed stock. In the event the material is already dressed to ¾", extreme care must be taken with the surfaces, to keep them from being dented or marked deeply. For this reason, a ⅞" stock is preferable since it can be planed and scraped to the required size.

First, select the best pieces for the exposed sides of the breakfront. These and the remaining pieces are to be marked with a soft crayon according to the positions they are to occupy in the piece of furniture. In cutting the parts from the lumber, make all lengths an inch or two longer and the widths an eighth or quarter-inch wider than required. Then, as each part is worked on it can be finished to the required dimensions with more accuracy. Meanwhile, should any dent or deep marks occur they can be eliminated in the dressing operation. All pieces should be placed flat or upright on ends and if possible be kept in elamps or under suitable weights until they are ready to be placed or assembled in sections. This will prevent warping.



SHOP TRAINING FOR VICTORY

A monthly department devoted to items of interest concerning war-training classes

Audio-Visual Aids

FOR WARTIME TRAINING

BY *Maurice E. Trusal,*

DIRECTOR OF AUDIO-VISUAL INSTRUCTION,
WILLIAMSPORT, PA., TECHNICAL INSTITUTE

Audio-visual instruction becomes increasingly important to teachers striving to improve quality and increase quantity of workers trained for war industries.

VOCATIONAL training instructions have been called on to increase the quantity and improve the quality of workers for war industries. Realizing that every minute counts, vocational educators in all sections of the country are turning to the field of audio-visual aids to increase the tempo and effectiveness of their training programs. For the first time in our national history, sight and sound, combined in the form of the sound motion picture and the sound filmstrip, are being put to work to aid in the training of war workers.

During the early months of 1942, initial plans were laid for the development of an audio-visual instruction program as a basic unit of the war-training section of the Williamsport Technical Institute.

Basic Criteria

The following principles, provisions, and procedures have been accepted as basic criteria in the organization and administration of the program:

1. The responsibility for organizing and administering the program is delegated to a director of audio-visual instruction, responsible to the director of the Institute.

2. The instructor is recognized as a basic factor in the training program. Audio-visual aids have little value in themselves but become effective only when closely correlated with shop instruction through carefully planned procedures.

3. Audio-visual aids are used according to accepted procedures of good teaching; prepare, project, test, discuss, and apply.

4. High-quality motion-picture films, filmstrips, and slides are secured from the Defense Visual Aids Section of the State Department of Public Instruction and commercial organizations, either on a long-term, free-loan, or outright purchase basis.

5. Mimeographed materials, including objective tests, are prepared for each film, filmstrip, and slide set used regularly in instruction.

Projection Facilities

A projection room, 35 by 35 feet, located in the basement of a newly completed shop unit, serves as a classroom for audio-visual instruction. The projector speaker, mounted on the front wall near the screen, is connected by overhead conduit with the sound block in the projection booth.

The booth is complete with two 16 mm. sound film projectors, sound filmstrip projector, rewind and splicing equipment, master light switch, monitor speaker, film vault, and ventilating fans.

Audio-Visual Instruction for Machine-shop

Twenty-three motion-picture subjects from the U. S. Office of Education's series, distributed by Castle Films, Inc., on Precision Measurement, Engine Lathe, Milling Machine, Vertical Drill, and Shaper, together with commercially prepared sound filmstrips on the milling machine, constitute the basis of our present audio-visual instruction for machine-shop trainees.

The machine-shop enrolment is divided into groups of approximately twenty each. These groups, designated as group one, two, three, etc., follow a rotating schedule which provides for a definite amount of time each week in visual and theory instruction. Instruction in theory, which includes testing on the films, is given immediately following the film showing by a competent instruc-

(Figure 1)

Name..... Section.....

AUDIO-VISUAL INSTRUCTION
WILLIAMSPORT TECHNICAL INSTITUTE
MACHINE SHOP THEORY

No.	NAME OF FILM	No.	NAME OF FILM	No.	NAME OF FILM
1.	Steel Rule.	9.	Drilling, Boring and Reaming.	16.	Rough Facing, Turning, and Drilling on a Vertical Turret Lathe.
2.	Micrometer.	10.	Cutting External National Fine Thread.	17.	Rough Facing and Boring and Turning a shoulder on a Vertical Turret Lathe.
3.	Fixed Gages.	11.	The Milling Machine.	18.	Facing, Turning, Boring, Grooving, Chamfering on a Vertical Turret Lathe using two heads.
4.	Vernier Scale.	12.	Cutting a Keyway.		
5.	Height Gages and Standard Indicators.	13.	Straddle and Surface Milling.		
6.	Rough Turning, between Centers.	14.	Straddle Milling.		
7.	Turning Work of two Diameters.	15.	Plain Indexing and Cutting a spur gear.		
8.	Cutting a Taper.				

P—Film Test Passed. NP—Film Test Not Passed. X—Absent.

PROFICIENT USE OF:

Vernier Caliper, I. D.	☐	Vernier Caliper, O. D.	☐
Inside Micrometer	☐	Vernier Micrometer Caliper	☐
Telescope Gage	☐	Planer and Shaper Gage	☐
Depth Micrometer	☐	_____	☐

tor in machine-shop theory. Manipulative practice then follows theory instruction.

Up to a certain point, motion-picture films, as used in our training program, are regarded as the equivalent of manipulative work on machine tools.

The Film Lesson

Correct methodology of teaching with motion-picture films includes four general steps or modifications thereof:

1. *Preparing the student for viewing the film:* Definite reasons for viewing the film must be established in the student's mind. It is only logical that the student be given a clear understanding of what the film contains and what he is expected to learn from it. One method of compiling this introductory information is a three-by-five-inch card index file. Each film is represented by a card which lists the major points covered in the film. These points are read to the student and discussed prior to the showing. An example of introductory information for the film, "Fixed Gages," is shown below:

U. S. OFFICE OF EDUCATION
DEFENSE TRAINING FILMS

Things to look for in the film: "Fixed Gages":

1. The various types of fixed gages and their importance in modern mass production.

Film lesson is not complete until trainee has applied information presented in film.

2. How fixed gages are used in the inspection rooms of a modern factory to measure outside and inside dimensions; to check internal and external tapers; and to measure threads.

3. Operation of "go-not—go" gages—Variations in the form of flush-pin, taper ring, and taper plug gages.

4. The meaning of the term, "Tolerance."

5. The correct use and the care necessary to maintain the accuracy of fixed gages.

2. *Showing the film:* The projection part of a film lesson should be carried out with a minimum of confusion. Last-minute set-ups are generally indicative of poor planning and have no place in a well-ordered film lesson. A good classroom atmosphere combined with correct teaching procedures will go a long way in assuring the maximum results from film use.

3. *Testing:* Of the several strengths of the motion picture as a teaching aid, the ability to impart information that is dependent on motion is the one most easily and frequently tested for. Objective or quick-check type of tests are easily prepared, and possess a high degree of reliability. A four-by-six-inch card containing the film titles makes a convenient system for recording test grades. Figure 1 shows one type of card found useful for recording test grade information. If a passed or not-passed film grading system is used, a *P* or *NP* is recorded after the film title on the record card. If a student fails a film test he should be scheduled for a reshowing the next time the film is projected.

4. *Discussion and summarization:* The final and probably the most vital part of a good film lesson is the discussion and summarization period that follows showing and testing. The discussion period affords an opportunity for an exchange of ideas between the instructor and student. Difficult concepts are emphasized and wrong impressions corrected. Opportunity is afforded for determining whether a reshowing is necessary.

In summarizing the parts of a well-

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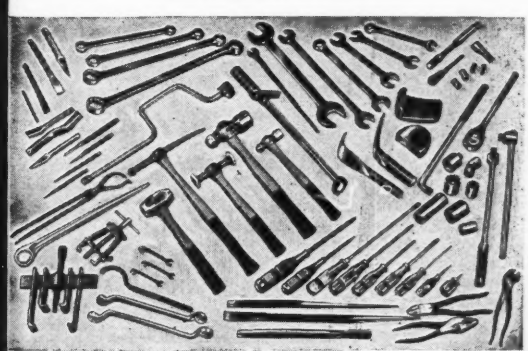

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Mechanical instruction fails to produce good mechanics if good tools are not used. Be sure your students reflect the excellence of your instruction by a knowledge of fine tools and how to use them. Free catalog on request. Plomb Tool Company, Los Angeles.

PLOMB

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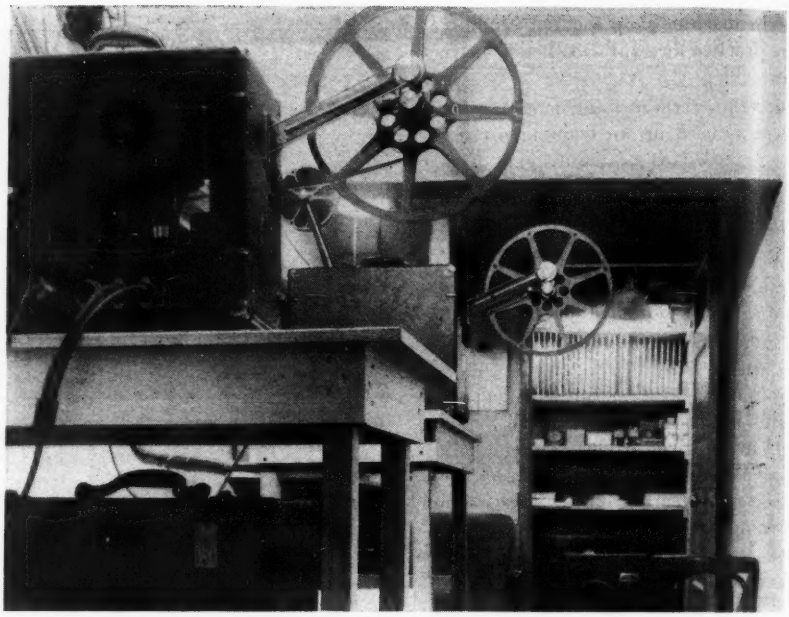
organized film lesson, it is not trite to say, "No film lesson is stronger than its weakest part." Without an introduction the student is not prepared for the film showing. If confusion accompanies projection, attention is drawn away from the film content. If we propose to use the motion picture as an aid to learning, then some form of testing is necessary to determine progress. Without discussion and summarization the job is only three-quarters complete. More emphasis on teaching and less emphasis on "showing" is the key to effective film use.



Well-appointed booth provides permanent placement of projectors, film storage, master controls for lights and sound.

Filmstrips

A careful analysis of certain values peculiar to the filmstrip indicates that high-quality filmstrips have a definite place in war-training programs. Sustained projection, frequently valuable for detailed study of charts, diagrams, and selected parts of machines and processes, is possible with modern filmstrips.

Silent filmstrips (discussional type), produced by the Jam Handy Organizations, are used for the visualization of aviation courses on motors, metalsmithing, maintenance, and theory of flight.

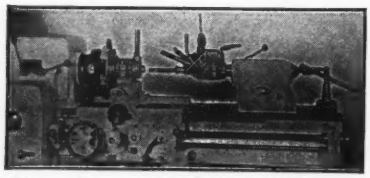
Conclusions and Problems Ahead

The application of sensory aids to mass training of industrial workers is still in its infancy. The most effective types of aids and methods of utilization are still to be determined.

Audio-visual aids of good quality, properly used, not only increase the effectiveness of instruction, but effect a major economy of training time. An important proportion of the instructional program can be assumed by motion pictures and filmstrips.

The use of audio-visual aids should be delayed until the trainee has gained a familiarity with the tools of the trade. This orientation period may vary from several hours to several days.

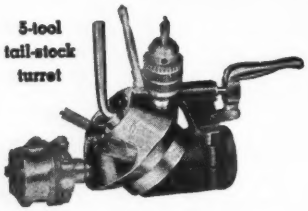
ANY ENGINE LATHE CAN BE CONVERTED INTO *A Turret Lathe* IN 15 SECONDS



Train TURRET LATHE Operators on your ENGINE LATHE

Photo shows turrets applied to 16" lathe

5-tool tail-stock turret



● This new modern TOOL-POST TURRET (below, right), made in 2 sizes, designed to increase production on engine lathes. Easily mounted on cross slide or compound rest. Has capacity of 4 standard tool holders which are easily inserted and rigidly held. *6 days delivery.*

pat. pending

4-tool tool-post turret

● Then there's the completely modernized 5-tool TAIL-STOCK TURRET (above), made in 4 sizes to fit small bench lathes and lathes up to 20" swing. Also the adjustable PULL-FEED LEVER. All tools are precision made attachments which will convert any engine lathe into a production turret lathe. *6 days delivery.*

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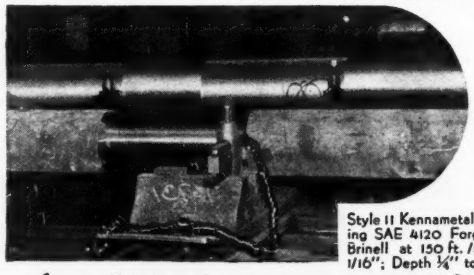

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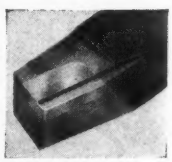

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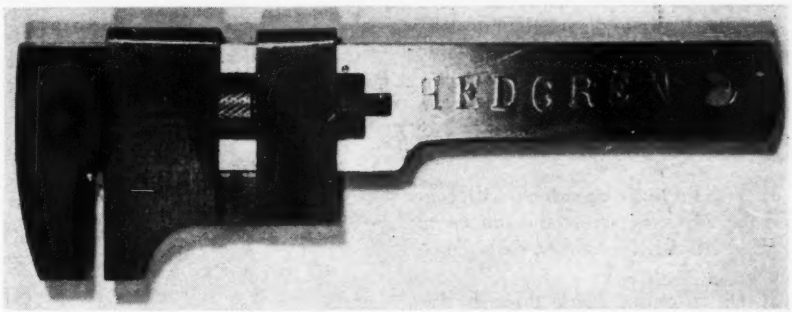
Adjustable Wrench

BY *Glen Christy*

This is a metal-unit project in job-sheet form used in the laboratory of arts and industries in the Senn High School, Chicago, Illinois, where the author teaches.



THE blueprint gives the dimensions you will need to lay out and make the adjustable wrench. Keep the drawing in front of you and refer to it for each dimension. This job sheet gives you the operations in their proper sequence. If you have a question, ask your instructor.

Body of the Wrench

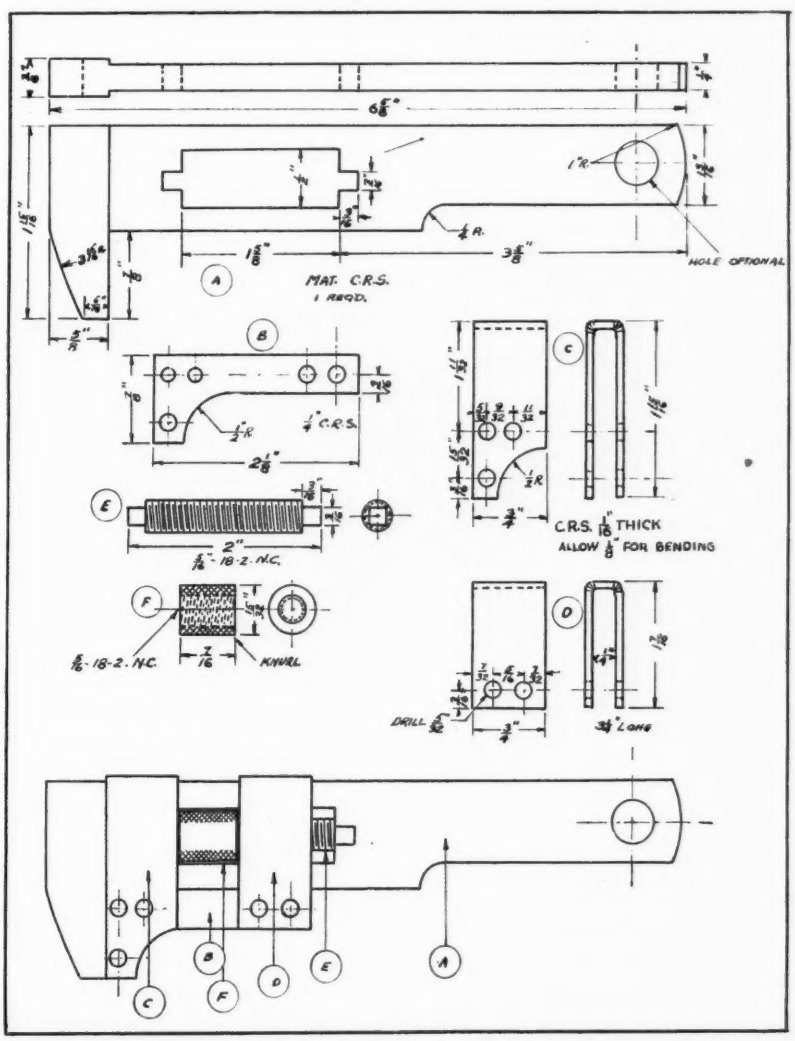
1. Cut stock ¼" or ⅜" x 2" to length. Allow 1/16" for finish. Stamp on name.
2. Clean oil and oxide from one side.
3. Copper coat this side with copper sulfate.
4. *All measurements are to be made from the back of the wrench.*
5. File and dress end square for the fixed jaw end of the wrench.
6. Draw a line on this end 90° to the back and ⅝" from the end.
7. From the head end of the wrench, draw a line 3¾" long parallel to the back and 1-1/16" from the back.
8. From the tail end of the wrench, draw a 2⅞" line, 13/16" from the back.
9. If your measurements are correct, the lines drawn in 7 and 8 will end ¼" above the other. Check.
10. On the line drawn No. 7 locate a point 4" from the head.
11. Set the divider at ¼" and with the point located in 10 make an arc of a circle intersecting line drawn in No. 8.
12. On the center line of the tail end of the wrench locate a point 1" from end.
13. Set the dividers at 1" and draw an arc across the end of the wrench.

Adjustable Screw Opening in Body of Wrench

1. Draw a line ¼" from the back and parallel to the back. Start 1¼" from the head and end the line 2-15/16" from the head.
2. Draw a line ½" from and parallel to line made in No. 1 corresponding to it in dimensions.
3. Use a square and draw a line perpendicular to the above lines making a rectangle.
4. Locate the centers of the ends of the rectangle and lay out the 3/16" x 3-1/16" slots which hold the adjusting screw. You now have a complete drawing of the wrench body on the metal.

Remove Metal from Body of Wrench

1. Lay out lines parallel to the lines you have already made 7/32" from the original lines. Do this work accurately and it will save time and labor. Use the same methods as for the original lines.
2. Make a center punch mark on the line you have drawn in No. 1.
3. Set your dividers 7/32" apart.
4. Make an arc on the line using the center punch point as a center.
5. Make a center punch mark where the arc intersects the line.



6. Proceed in like manner until there are center punch marks 7/32″ apart along the lines laid out in No. 1.

7. Draw diagonals of the square which will be slots for adjusting screw.

8. Where these diagonals intersect, make center punch marks.

9. Take your work to the instructor and have it checked. This will save you time and labor.

Drill

1. For the opening which will contain the adjusting screw and nut use a 5/32″ drill. Drill a hole on each punch mark.

2. On a center mark through this opening, and 7/32″ from one end, drill a ⅜″ hole.

3. At each end of this opening is a 3/16″ square with a center punch mark in the center. Drill a 3/16″ hole at this punch mark.

4. At each center punch mark on all other lines drill a 3/16″ hole.

5. Use a ½″ chisel and cut metal between drill holes.

6. Break off undesirable metal. Save metal cut off for adjustable jaw.

7. File carefully to shape.

Adjustable Jaw

1. Use metal removed from body of wrench.

2. Copper plate, if it is not already plated.

3. Lay out as indicated on drawings.

4. Be very careful. All angles of 90° must be accurate. Parallel lines must be parallel.

5. Lay out a line to drill on 2/32″ from the actual line of jaw shape.

6. Drill end cut with chisel.

7. Remove metal.

8. File to shape.

Guides for Adjustable Jaws

1. Figure length of stock allowing ⅛″ for bending and ¼″ across the back of wrench.

2. Cut to length.

3. File roughly to contour of jaw.

4. Drill front jaw guide and rivet into place on jaw.

Adjusting Screw

1. Thread a 3/16″ C. R. S. bar a distance of 2½″. Use thread-cutting compound.

2. Cut this threaded stock 2″ long.

3. File the two ends square. Be careful to make the sides of square at one end parallel to sides of other end.

4. File two parallel sides on screw so that it will pass through guides.

Adjusting Nut

1. Cut stock from ⅝″ C. R. S. 2″ long. Any short piece from 4″ to ½′ will serve.

2. Place stock in chuck, face and turn to 7/16″ diameter by ¾″ length.

3. Drill ¼″ hole 1″ deep and tap with 5/16″—No. 18 tap.

4. Knurl the ¾″ length.

5. Cut off a knurled nut 7/16″ long.

Assemble Wrench

1. Assemble all pieces in place and check for any binding. All parts must move freely.

2. Drill rivet holes for movable jaw guides.

3. Draw, file, and polish all parts.

4. Take all parts to your instructor and have them checked.

5. Assemble and rivet movable jaw.

6. Polish movable jaw.

7. Pack harden wrench.

Combination Stool and Stepladder

BY *Harold O. Akeson*

This is a useful woodworking project developed by Harold O. Akeson who teaches at the East Orange, N. J., High School.

POPLAR, or whitewood, is suitable for this project but oak, ash, or maple can be used if preferred. Construction should be started with the legs. Next prepare the steps, spreaders, and rails. In selecting material for the top, a solid piece is preferable to gluing up several pieces of stock.

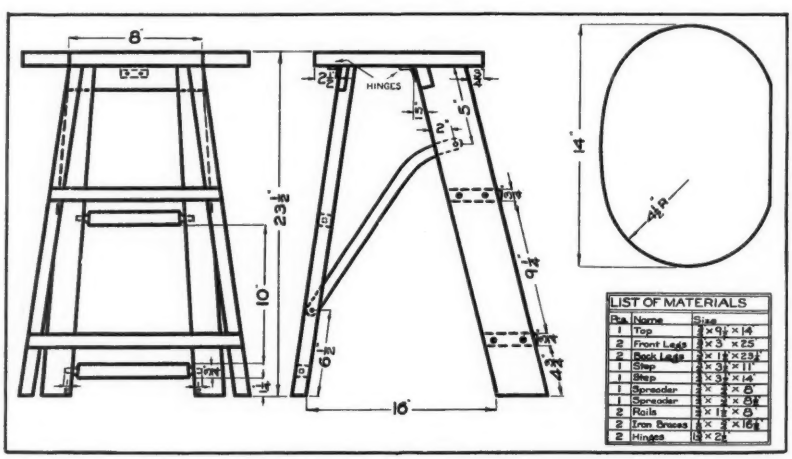
After preparation of the material and the joints of the various pieces, locate positions of the steps. These are slightly round on the top, outer edge. Drill ¼″ holes for 1¾″ No. 10 round-head blued screws to hold steps on front legs. Both the spreaders have ends tapered and a ½″ dowel fitted into them and a ½″ hole on the edge of the back legs. The two rails are fitted to the front and back legs forming an end lap joint.

Assemble and glue parts of the back of stepladder. Then the front part of the ladder. The top brace is glued as well as fastened with screws.

Locate hinges on under side of top and inside of the front and back legs. Find angle of legs and cut to sit evenly on the floor. Finally make the iron braces from ¾″ band iron. Place them on the inside of the legs as indicated on the drawing and fasten with ¾″ No. 6 round-head blued screws.

The finish for the job is optional. It may be left natural, with a shellac or varnish finish, or it may be painted to suit the color scheme of the room where it is used. The band-iron brace should be painted with black paint or lacquer.

To fold stepladder, grasp front of top, or seat, above the steps and by lifting upwards the ladder closes by its own weight.


8"
HINGES
23½"
10"
16"
14"
LIST OF MATERIALS
No. Name Size
1 Top 1 × 9½ × 14"
2 Front Legs 1 × 3" × 25"
2 Back Legs 1 × 1½ × 23½"
1 Step 1 × 3½ × 11"
1 Step 1 × 3½ × 14"
1 Spreader 1 × 2" × 6"
1 Spreader 1 × 2" × 8½"
2 Rails 1 × 1½ × 6"
2 Iron Braces 1 × 2" × 16½"
2 Hinges ½ × 2½"

Adjustable Jig for Cutting Dowels

BY *I. M. Fenn*

This useful project may be made from scrap materials and involves the teaching of a number of processes. I. M. Fenn teaches in the Chicago, Illinois, Vocational School.

A JIG for cutting dowel rods to any length desired is a very handy, useful project and a welcome gadget in the industrial arts laboratory and woodworking shop.

Students are enthusiastic about making this jig because they find it interesting, useful, and simple to construct as well as an excellent item for the home workshop.

The students experience the following operations in the process of construction:

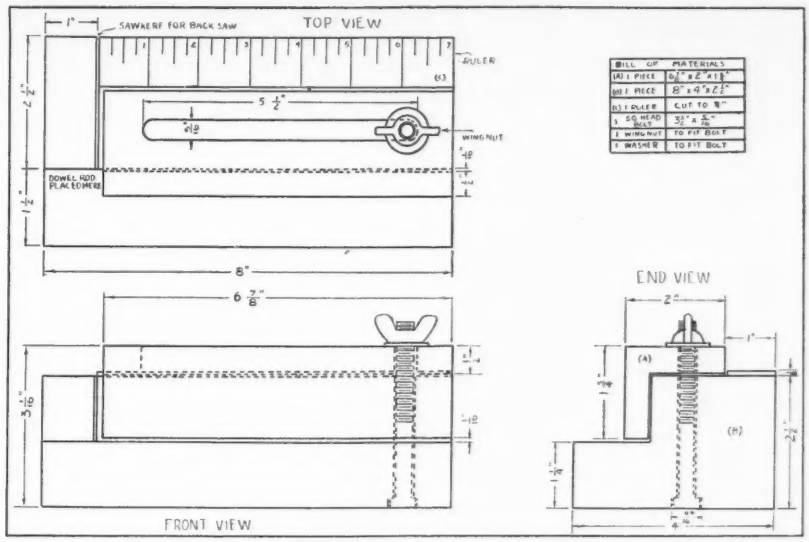
1. Reading a blueprint or drawing.
2. Laying out material.
3. Gluing.
4. Sawing.
5. Using a marking gauge.
6. Planing to size.
7. Boring.
8. Chiseling.

The jig also provides the instructor with an opportunity to give the students instruction in the use of the circular saw and drill press.

The dowel jig may be made from any hardwood scraps which can be glued up to the required sizes designated in the drawing. An inexpensive 12-inch ruler can be cut to necessary size, and tacked to the jig.

The jig should be clamped in the bench vise when it is being used. Instructors may enlarge this jig to fit special jobs.

Instructors may also do their part in the national defense program by using more of these smaller projects which require very little material and yet give valuable experiences and information, instead of projects which do not allow for any more experiences but necessitate the use of large quantities of materials.



Brazing Band-Saw Blades

BY *Milton Schrag*

Here is a project for the welding class which will be found useful in any school shop. Milton Schrag teaches in the Augusta, Kansas, schools.

BY USING the oxyacetylene torch it is possible to cut down considerably on the length of time required to repair broken band-saw blades. The following method has been found preferable to using the silver-soldering technique, as for the latter it is necessary to file a bevel for the lap joint.

The only equipment needed is a band-saw brazing clamp, files and micrometer.

A clamp may be easily constructed as a project in the welding class by referring to Fig. 1.

The entire clamp may be fabricated by welding. Care must be taken to get the two top halves of the channel lined up properly.

The two nuts which receive the bolts may be brazed into position. Before doing this, however, it is necessary to true up any discrepancy in the top pieces and remove any fillet on them with a flat file.

Small details in dimensions have been omitted as they are inconsequential and may be varied to suit the builder.

During use, this clamp may be fastened in a vise.

The only preparation for brazing the blade that is needed is to file a slight open angle on the end at the break (see Fig. 2). Failure to do this may result in an imperfect bond with the bronze.

The procedure for brazing is as follows:

1. Clamp the blade on fixture, being

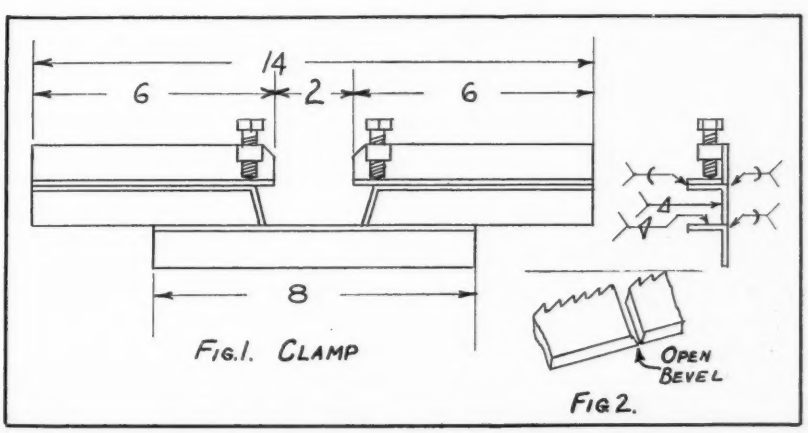


FIG. 1. CLAMP

FIG 2.

IN THE Morning Mail...

[Brief comments about SCHOOL SHOP *and the field it serves are invited. Address the Editor,* SCHOOL SHOP, *Ann Arbor, Michigan.*

● Arriving after the October issue had gone to press, Mr. Pratt's answer is published herewith to the October question-of-the-month: "How can the schools do a more effective job of training war workers for industry?"—*Ed.*

Gentlemen:

At one time, learning to be a pilot consisted mainly of learning to cluck convincingly and to hold the reins firmly. Now see what it takes—high-school aeronautics, college, ground school, flight training, endless hours of study of fundamentals of flight.

In much the same way, the metal-removal "pilot's" job has grown up. No longer is the teaching of control-lever manipulation of any great importance; nearly any school boy can learn this in a short time. Most Americans have by now had an opportunity to manipulate a variety of mechanical devices, and already have the "feel."

"Endless hours of study of fundamentals"—that should be the vocational school's objective, just as it is for the schools which develop farm boys into bomber pilots. Machine hours are now and will continue to be as precious as jewels; the valuable employee is the one who knows how to get the maximum production from a machine tool in the minimum amount of time and with the least possible wear and tear.

A good basic understanding of the uses of hand tools, precision measuring tools, and simple blueprints is an all-time necessity. Today's employee should come to us also acquainted with the basic facts about proper cutting feeds and speeds, the use of sintered carbide cutting tools, cutting lubricants, and the types of cutting tools and their uses.

D. F. PRATT, Director, Training School,
Cincinnati Milling Machine Co.,
Cincinnati, Ohio.

---

careful to accurately line up the blade ends.

2. Braze with oxyacetylene torch, using Brazo flux, and Oxweld No. 25M (or equal) 1/16" bronze rod.

3. File off excess bronze so that the blade diameter is uniform. This measurement may be checked with a micrometer.

4. You need not anneal or temper this joint.

For those not familiar with brazing, the following instructions will be found helpful:

1. Use a small tip size (about No. 70-72 drill size).

2. Adjust flame to slightly oxidizing (excess of oxygen).

3. Heat bronze rod and dip into flux.

4. Heat saw joint and apply flux with rod.

5. Heat joint to dull red and melt rod into joint by placing rod directly under flame.

Pro & Con . . .

Gentlemen:

I feel tempted to answer the article in the September SCHOOL SHOP, *Blueprint Reading vs. Drawing,* by Benjamin J. Stern.

I am first of all a vocational teacher and have made a serious effort in the past 11 years to analyze the accomplishments of high-school graduates and have come to the following conclusions: There are two educational groups that continuously handicap the youth of this nation. The first are counselors and others allied to the cause of finding a substitute for study; and the vocational teachers, of which I happen to be a member. . . .

As to the article, I am a technical graduate in engineering and have had a few years of practical experience. I was also hired for my present position because of my technical training and not for the work pursued in a school of education.

Drawing is a necessary part of an individual's high-school training whether he plans to go to college or enter employment immediately. A student who does not plan to attend college should by far have all the mathematics he can acquire (not trade math) and the other science subjects. It is a sin for teachers to stigmatize any youth with mediocre training or subject matter.

Blueprint reading has a place, very decidedly, but its place is in adult education, for those who are out of high school and have been handicapped by their own unwise decisions or the false counsel of those presumed to be in authority.

I am in contact directly with the employers of this locality and have never had anyone express a desire that their new employes from high school be taught blueprint reading in any other way than the medium of drawing. I am happy to say those girls who have been in my classes are successfully employed because they have taken drawing. None of the girls as yet are doing work on a drafting board but are advanced to positions of responsibility where blueprint reading through a knowledge of drawing is a requirement. . . .

E. C. WEBB, Instructor, Engineering Drawing, Riley High School, South Bend, Ind., and Lecturer, Engineering Extension, Purdue University.

Gentlemen:

It is evident from Mr. Webb's letter that he has not read my article closely, for he seems to have missed my point completely. Nowhere in my article is there any implication that substituting blueprint reading and shop sketching for mechanical drawing the first year is meant as a "softener" or to ease up or cheapen the course of study. On the contrary, it is simply, as I clearly stated, a matter of placing course emphasis where it belongs.

Again referring to Mr. Webb's chief complaint about mediocre training, I would be glad to submit to him or to anyone else my course of study. This is an intensive year's work which is intended to give the student a firm working grasp of the essentials of mechanical drawing through the medium of blueprint reading. Also it provides training in the ability to visualize, which is so often lacking in the ordinary rote teaching.

While it is true the student may not be able to create pretty "plates," he still will have a real understanding of what he is doing. Too often I have encountered boys who can use instruments to make a beautiful "plate" without in the least understanding or visualizing what they are doing. If my idea seems unorthodox, it is about time we had some unorthodox thinking on the subject. . . .

BENJAMIN J. STERN,
Instructor of Drawing,
New York, N.Y.,
Vocational High School.

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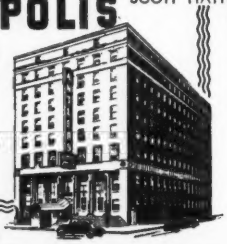

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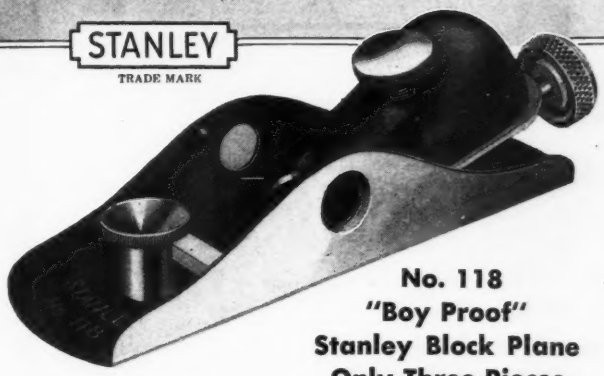

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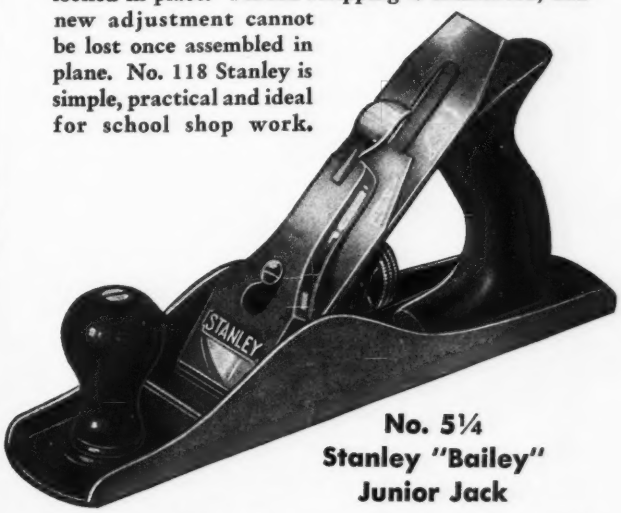

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This popular small size Jack Plane was developed especially for the smaller boys in the school shops. Has the same perfect balance, comfortable "feel" that make Stanley "Bailey" Planes the favorites of woodworkers everywhere. Junior Jack is 11½ inches long. Width of cutter is 1¾ inches. Note newer pear shape hole in cap that stops back slipping.

For complete details on these and other Stanley Tools, write for Catalog 34.

STANLEY TOOLS

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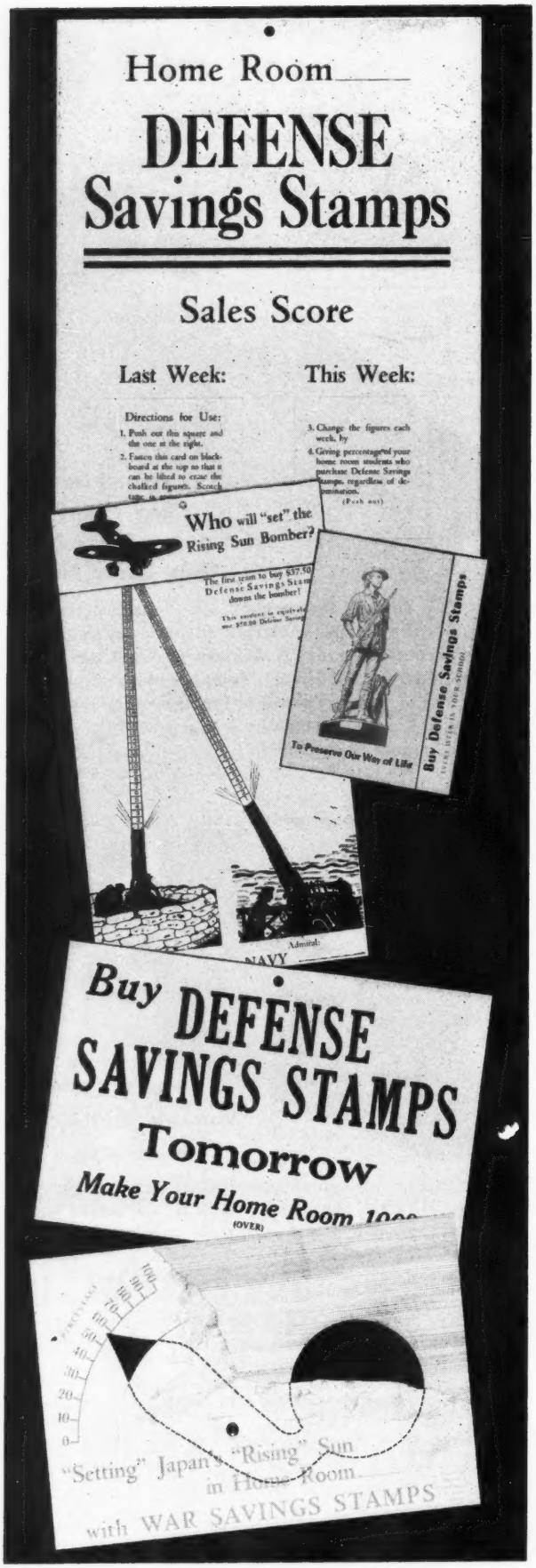

A School Print Shop

AIDS THE WAR EFFORT

BY *R. Randolph Karch,*

PRINCIPAL, CINCINNATI
PRINTING HIGH SCHOOL

THE graphic arts can and are playing an important part in the sale of War Savings Stamps to school children. Things visual have more meaning than things talked about. While there are many devices published by the government for use in the promotion of the sale of War Stamps, the school print shop can supplement these with materials especially adapted to local school needs.

The homeroom teacher usually has the vital role in the sale, especially if placed in authority as agent. Graphic arts products can help set up rivalry between teams, or perhaps boys and girls if the sexes are evenly divided in the room. The teacher who merely asks: "Does anybody want to buy War Stamps today?" is obviously using a negative manner, and her students will not respond. A more positive question could be asked: "How many War Stamps can we buy tomorrow to help the government finance the war against those who have attacked us?"

Assuming then that the teacher is on the job encouraging sales, printed, lithographed, or silk screened materials can be furnished to help the effort. Illustrated are several devices that have been used effectively in the Cincinnati schools.

Reminder cards.—The purpose in view here is to remind students that "Tomorrow is the Day to Buy War Savings Stamps." On the reverse side of the card the copy reads: "Buy War Savings Stamps Today." In this way the sign carries two messages, and can be put up, turned, and taken down by the homeroom teacher according to the day of sale. Red and blue inks on white paper give patriotic color to the cards.

Percentage Cards.—The blackboard can be utilized with this card, which is die cut in squares which may be pushed out as shown. The idea is to show the percentage of the students participating. The card indicates, without the monetary angle, what *participation* each room gives to the war effort.

No attempt should be made to set one class against another in the value of the sale, as some children cannot afford to buy relatively large quantities of stamps without loss of necessary personal comfort or even nourishment. In practice, this participation plan worked out to actually increase the monetary value of the sale, as well as the participation, without the possible difficulties with parents who might believe that undue pressure was placed on their children.

Folders, printed in red and blue on white paper, can explain the idea of the stamp sale and the interest received on the investment in simple terms for both parents and pupils.

Cuts of cartoons drawn by leading comic artists currently

These printed devices have found a useful place in the campaign being continuously carried on in the Cincinnati, Ohio, schools for the sale of War Savings Stamps. Moreover, they represent good teaching projects for color printing and die cutting in the school print shop. R. Randolph Karch is Principal of the Printing High School, Cincinnati, where these projects were designed and produced with the help of local manufacturers who donated all materials used.

popular with students are available from the Treasury Department. In Cincinnati, these matrices were assembled and sent to a stereotyper, who cast 25 cuts, which were routed to school newspaper and magazine editors in a regular schedule. Most of the publications ran all of the series—at no cost either to the school or to the printer.

Another poster shown at the left creates interest on the part of the students in the sale of War Savings Stamps. The front of the poster shows pictures of Army and Navy anti-aircraft guns. The back of the poster explains its use:

1. Two opposing teams are elected or appointed. Names of respective teams are written on the back of the chart in the space provided.
2. Team leaders are an "Admiral" for the Navy gunner and a "General" for the Army gunner.
3. Fold over the top flap on the poster so that the words "Who will 'set' the Rising Sun Bomber?" appear, and hang on the wall.
4. Campaign is waged to see which team first buys stamps to the total of $37.50.
5. Each week the "gun fire" is filled in with red pencil over the amounts which appear in one-dollar denominations.
6. The first team to buy $37.50 in stamps causes its projectile to explode the Jap bomber.
7. When bomber is downed, turn over the flap showing the exploded bomber, write in the name of the winning team and the date, and hang on the wall as a record. Repeat the campaign as long as interest lasts.

The rising sun of Japan in this device sinks behind a hill according to the percentage of participation in the sale of War Savings Stamps in the homeroom. Hung in each room, all students may see just how much that particular group has contributed to the financial support of the war effort. The sun and the arrow are cut out of one piece of red cardboard pivoting on a brass paper fastener, the head of which can be seen above the word "Rising" in the text.

A "School Champion" Card can be furnished to each school. The homeroom which has the greatest percentage of participation in the sale of War Savings Stamps will keep the sign on display as long as the particular homeroom is highest in percentage of participation on the part of students.

Another service to schools consists of a speakers bureau which principals may call to secure the services of certain individuals who can explain the value of stamps in winning the war. An announcement of this service was printed and distributed to all principals.

Various other printed materials facilitate the business side of a continuous War Savings Stamp campaign. Incidental jobs for the graphic arts department would include records for individual sales for homeroom teachers, report forms of sales for the superintendent's office, and financial record forms for school treasurers.

In the Cincinnati campaign, all materials were donated by patriotic supply houses for the manufacture of all graphic arts aids to promote the sale of War Savings Stamps. Materials included donations of paper, cardboard, ink, photoengravings, electrotypes, stereotypes, cutting rule, foundry cuts, etc. Therefore not one cent of cost was borne by the taxpayers, as the manufacture was carried on at Printing High School by students.

Results of the campaign as carried on in Cincinnati are good. Weekly sales often run from $11,500 to $12,800 in stamps of 10- and 25-cent denominations. Often the *per capita* sale runs over 25 cents each week.

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. . . news from INDUSTRY

For items listed in this column, readers may address the firm named or write to News from Industry Dept., SCHOOL SHOP, Box 100, Ann Arbor, Michigan.

McGraw-Hill Book Co. Issues New Catalog

A 304-page catalog listing the complete McGraw-Hill and Whittlesey House list of books has just come from the press. All books are classified as to subject matter—several sections of the catalog being of special interest to SCHOOL SHOP readers. Among these are Aeronautics and Automotive Engineering, Applied Electricity, Construction, Drafting, Machine-Shop Work, and others. Copies of the catalog may be had without charge by writing the company at 330 W. 42nd St., New York, N. Y., or to SCHOOL SHOP.

New Catalog Shows Boice-Crane Machine Tools

Boice-Crane Co., Toledo, has just published catalog No. 42, completely describing and illustrating its line of wood- and metal-working machine tools. Among the machines described are the Boice-Crane circular saws, metal- and wood-cutting band saws, planers, shapers, drill presses, etc. Much space is also devoted to the proper selection, care, and use of machine tools to provide long life and usefulness.

New Booklet Describes 'Mogul' High-Speed Steel

Jessop Steel Co., Washington, Pa., has recently issued a colorful booklet describing its "Mogul" high-speed steels. These molybdenum-tungsten steels are widely used for lathe and machine-tool cutting tools, and the booklet describes with tables, charts, and pictures, the various characteristics, analyses, and applications of the "Mogul" steel. Important features of the steel, as pointed out in the book, are lower hardening tempertaure, cutting ability superior to 18-4-1 type, and lower cost. Copies of the book may be had without charge from the Jessop Steel Co. or from SCHOOL SHOP.

Wet-Dry Belt Surfacing Subject of Porter-Cable Book

In its new "Wet-Dry Belt Surfacing" booklet, Porter-Cable Machine Co., Syracuse, N. Y., describes its complete line of wet-dry belt surfacing machines and the many time-, money-, and labor-saving applications they provide, as contrasted with conventioned surfacing methods. Advantages of this method over milling, cutting, and filing in many applications are shown through photographs of actual parts finished with Porter-Cable machines.

Among the Porter-Cable belt surfacers described are both small and large models, as well as disc and spindle machines to supplement the belt equipment. Copies of the booklet may be had without charge by writing Porter-Cable Co. or SCHOOL SHOP.

Carbide Specialists Turned Out by Carboloy

Over 200 hundred carbide-tool specialists have been trained for some 100 major industrial concerns during the first six months of 1942 by the training school of Carboloy, Inc., Detroit, makers of Carboloy carbide cutting tools.

Designed for advanced training of men who will have complete responsibility in a given plant for all phases relating to design, application, and care of carbide tools, the course is the most intensive in the industry, taking only one week for completion.

McKenna Metals Publishes New Carbide Tool Catalog

Specifications and prices of Kennametal steel-cutting carbide tools and blanks are covered in a new catalog, No. 42V, just issued by McKenna Metals Co., 274 Lloyd Ave., Latrobe, Pa.

Complete in every detail, the new catalog contains both drawings and photographs of each standard type Kennametal tool. Typical applications of each tool are also illustrated. Several pages are devoted to selection and design of tools and blanks, chip-breaker designs, correct grinding, boring-tool setups, and other data. A visual index inside the front and back covers makes it easy to find the tools or information wanted.

Copies may be had without charge by writing the company or SCHOOL SHOP.

WHAT'S DOING IN THE FIELD

news

OF INDUSTRIAL EDUCATION

AMERICAN EDUCATION WEEK will be observed November 8-14 under the theme of "Education for Free Men." School participation in the observance will consist of interpreting to the people of the country the part played by the schools in the war and the increasing necessity of education during the war.

FIRST eastern regional conference planned by the National Graphic Arts Education Association is scheduled for Saturday, Nov. 14, under the sponsorship of the New York Printing Teachers Guild. Meetings on the Pacific coast already held were at Seattle, Oct. 3; San Francisco, Oct. 10; Los Angeles, Oct. 17. A conference was also held at Dallas, Texas, on Oct. 24.

AS THE model aircraft program of the Navy Bureau of Aeronautics reaches its goal, Navy officials have asked for continuation of the program indefinitely as long as schools are interested.

Reports indicate that approximately 8,000 instructors and 300,000 students have participated in the model aircraft project.

THE September issue of *Occupations, the Vocational Guidance Magazine,* is a special wartime manual for counselors giving complete and authentic information on the opportunities in the armed services. Copies may be obtained for 50 cents from the National Vocational Guidance Association, 525 West 120th St., New York, N. Y.

A NUMBER of other organizations are meeting simultaneously with or just prior to the AVA convention in Toledo, December 2-5. These organizations are:

National Association of State Directors of Vocational Education, Dec. 2, 3.

National Council of City Administrators of Vocational Education and Industrial Arts, Dec. 2.

National Association of State Supervisors of Trade and Industrial Education, Dec. 2.

National Association of Trade and Industrial Teacher-Trainers, Dec. 2.

National Association of Trade School Principals, Dec. 2.

Strictly Personal...

ABOUT YOUR FELLOW TEACHERS

THE retirement has been announced of JAMES HARRIGAN, principal of the McKee Vocational School, Staten Island, N. Y. . . . Promoted to supervisor of industrial arts at Sharon, Pa., public schools is F. N. NEWTON, Jr., teacher of mechanical drawing in the Sharon schools. . . . Brig. Gen. FRANK J. McSHERRY has been named director of operations of the War Manpower Commission. . . . Now supervisor of industrial arts for North Carolina is Dr. JOHN R. LUDINGTON, formerly associate professor of industrial arts education at North Carolina State College. . . . CHARLES KEMP is now director of vocational education in Flint, Mich., schools, replacing HARRY BURNHAM, who is on leave to enter personnel work with AC Spark Plug Co. . . . The death was announced this summer of W. C. WILSON, for many years head of the department of industrial arts at State Teachers College, Johnson City, Tenn. . . . ROBERT S. HALE has replaced GEORGE PRICE as director of vocational education in the Battle Creek, Mich., schools who has entered industry.

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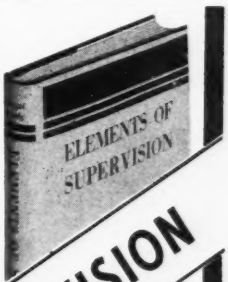

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instructional resources

Inquiries concerning materials described in these columns may be addressed to SCHOOL SHOP, Box 100, Ann Arbor, Mich., and will be passed on to the proper firm or person.

Aircraft Engine Maintenance. Suddeth. New York: John Wiley & Sons, Inc., 1942. Pp. ix + 374. $2.75.

This book covers aircraft engine maintenance completely, including carburetion, lubrication, ignition, propellers, etc. Assuming, however, the need on the part of the student for related information, the text also includes chapters on operation of the engine, its theory, engine components, vibration. Index; drawings and photos.

Author James H. Suddeth, Lt., A-V(S), U. S. N. R., was formerly maintenance engineer, Eastern Air Lines, Inc.

The Metal Crafts. Johnson & Newkirk. New York: The Macmillan Company, 1942. Pp. vii + 152.

An industrial arts textbook on the fabricating of metals—emphasis is on the relation of the shop project to the larger aspects of the same metalworking problem as faced in industry. Chapters included cover sheetmetal, machining, foundry work, art metal, and metal spinning. Each chapter concludes with questions, discussion topics, and references. Index; photos; drawings.

William H. Johnson is superintendent of the Chicago schools. Louis V. Newkirk, a member of SCHOOL SHOP's editorial board, is Director of the Bureau of Industrial Arts Education in the Chicago schools.

Arc Welding Job Training Units. Chicago: American Technical Society, 1942. Pp. 103. $1.25.

Another in the job-training unit series prepared by the staff of Dunwoody Industrial Institute, Minneapolis. Exercises are presented in a series of job sheets, each job covering a separate technic. Each job includes list of equipment needed, general instructions, operating steps, review questions, related information, and a page of checkup questions. Illustrated with diagrams and photos.

Blueprint Reading at Work. Rogers & Welton. New York: Silver Burdett & Company, 1942. Pp. viii + 136. $1.28.

The authors have presented in this text the method of teaching blueprint reading used in their own work, beginning their discussion of the subject with 3-view drawing and progressing to sections, threads, auxiliary views, gears, etc. Included also are chapters on welding and sheetmetal practices, acknowledging the growing importance of these fields in war production and industry in general. With each chapter are blueprints and questions requiring interpretation of the print by the student. Index, photos, drawings.

W. W. Rogers teaches at Edison Technical and Industrial High School, Rochester, N.Y. P. L. Welton is head of the departments of mathematics and science, Jefferson High School, Rochester.

Modern Welding Practice. Althouse & Turnquist. Chicago: Goodheart-Willcox Co., 1942. Pp. 412. $4.00.

The first part of this book is devoted to a discussion of gas and electric welding theory and practice, and a description of the equipment used in each type. Also discussed are soldering and non-ferrous welding.

Chapters are given to special welding problems such as pipe and tube welding, cast-iron welding, cutting, etc. Related chapters deal with history and manufacture of metals, heat treatment, and other technical information. Photos, drawings, tables, tests, questions, index.

A. D. Althouse is supervisor of vocational education in the Detroit, Mich., schools; C. H. Turnquist is welding supervisor, vocational training for war workers, Detroit. Collaborating on the book are G. E. Tabraham and B. E. Ott, both of the Detroit schools.

Blue-Print Reading. Hobart. New York: Harper & Brothers, 1942. Pp. 105. $1.00.

First portion of this book deals with the nature of the blueprint and increasingly complex drawings. Special treatments are shown, such as omission of detail behind cutting plane, revolved sections, sections through thin ribs, etc. A chapter on pictorial sketching is also included. Second section is a series of problems requiring the interpretation of the print by the student.

D. E. Hobart is associate professor of mechanism and engineering drawing at the University of Michigan at Ann Arbor.

Engine Lathe Operations. Whipple & Baudek. Bloomington: McKnight & McKnight, 1942. Pp. 147. $1.60.

Introductory units cover the nomenclature and construction of the lathe, as well as the care of the machine and safety procedures. Lessons begin with locating centers for straight turning, drilling center holes, mounting faceplates, etc. Units progress from here through the setting and care of tools to the turning of threads, tapers, and special forms. Grinding, heat-treating, and annealing are also covered.

G. C. Whipple and A. C. Baudek are assistants to the educational director, McDonnell Aircraft Corp., Lambert Field, St. Louis, Mo.

Blue Print Reading and Sketching. Thayer. New York: McGraw-Hill Book Co., Inc., 1942. Pp. viii + 135. $2.25.

Introducing this text is a discussion of perspective, pictorial, and orthographic drawings, the need for clearness and accuracy, and the process of making and reproducing the drawing. First approach is to the single orthographic view, progressing to the use of several views, sections, fastenings, architectural drawings, etc. Chapters on oblique and isometric drawings, and symmetry. The requirements of special trades are also dealt with, such as electricity, plumbing, structural steel, and others. Each lesson contains drawings, related information, exercises, and questions. Index.

H. R. Thayer is assistant professor of engineering drawing at Pennsylvania State College.

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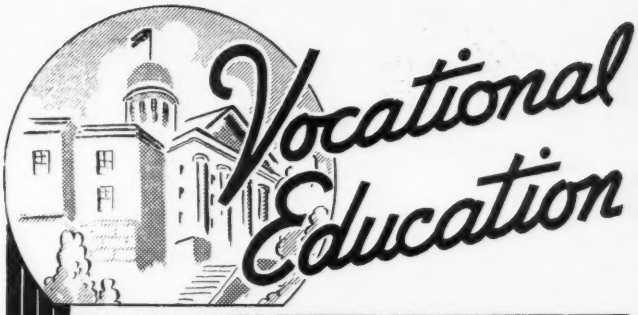
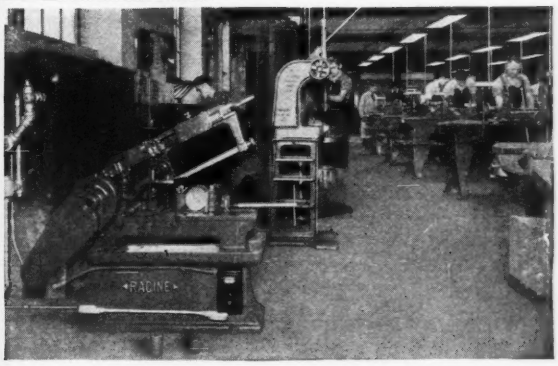
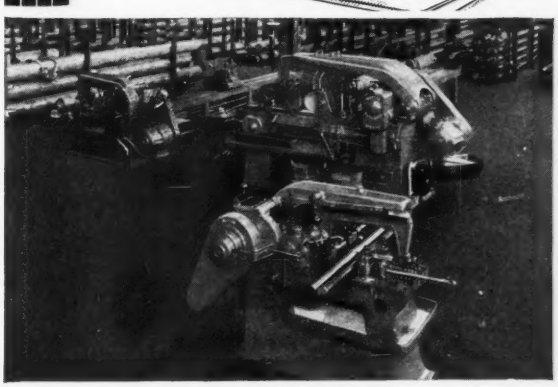




FOR Industry



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BUILDING A NEW VOCATION—

Technical Radio

BY *K. L. Dragoo*

TWENTY years ago, the training of men in the field of technical radio was nearly nonexistent. The training of machinists, electricians, motor mechanics and others pretty well covered the field of true vocational training. Radio, aeronautics, metallurgy, and the dozens of courses now offered in a modern vocational school were either nonexistent or were considered as true engineering courses to be offered by colleges.

A definite trend has been established to break down the highly technical subjects into trades that can be taught by a modern trades school. I say *established*, because the breakdown of the professional course required a great amount of effort. Colleges and the engineering profession were very reluctant to release any of their power in the field, and put up a stiff battle. During a period of years this reluctance was broken down by industry in its demand for more and more men which the colleges could not train, and by the inroads of planned vocational programs on school curriculums.

Building the training program for technical radio men followed this pattern. As a working example, let us consider a modern radio training center, the Samuel Gompers Trades School, a unit of the San Francisco Public School System. Prior to 1938, several high schools and evening schools offered radio as an avocational subject. The attendance of these courses was irregular, and little or no attempt was made to cooperate with industry and labor groups in the placement of students.

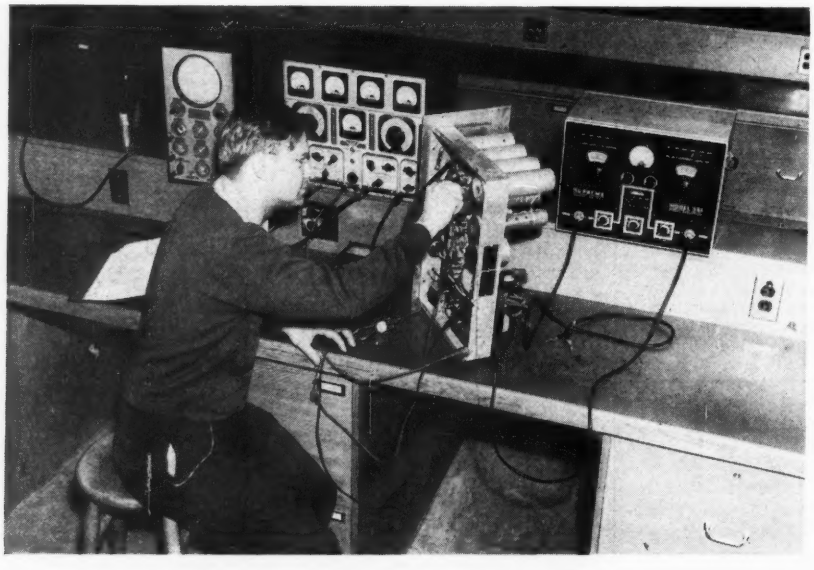
In 1938 the new Samuel Gompers building was opened with provision made on the third floor for a large combination radio and electric shop of the laboratory type. This shop was soon found to be highly inefficient, because of the difficulty of conducting four classes in one shop, and because of the differences in the radio and electric trades.

In 1939 the opportunity arose to sell the idea of a complete radio department in a new Samuel Gompers unit. This new building adjoins the original one. On the fourth floor, quarters are found for KALW, the FM broadcast station, complete with studios, shop, offices, and control room. This station is equipped with the latest RCA professional equipment, costing $35,000, and houses not only station personnel but radio operation classes as well. Classes in announcing and radio writing have two large 25′ x 36′ rooms for their work, with an announcing booth, record library, and sound effects available. A large radio service shop, 30′ x 65′, is on this floor. Forty bench positions are available in the service shop, with the most modern servicing instruments. A companion radio shop of the same size and equipment is used to train 40 U. S. Army Signal Corps men to be radio mechanics.

Student radio technicians installing the latest type police antenna at Station KALW.

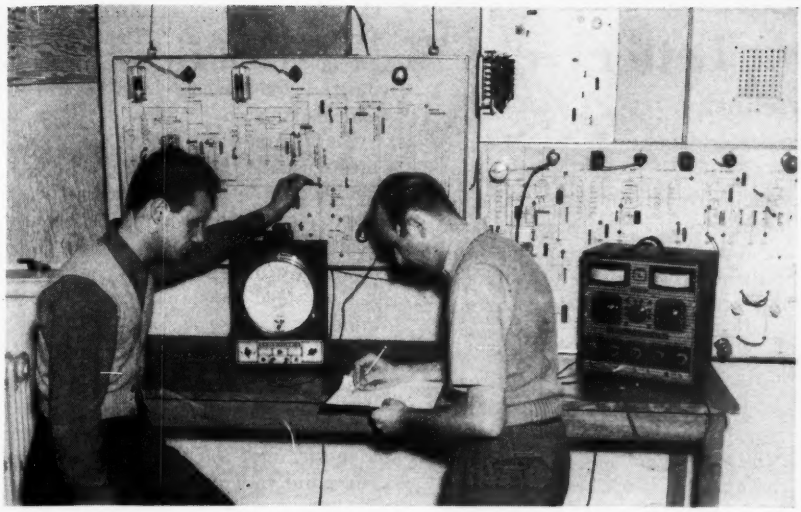
When the Signal Corps needed radio men for the war, Samuel Gompers Trades School at San Francisco had the facilities to train them. Author Dragoo, who is chief engineer of the school radio station KALW, tells how his department was organized for professional radio training.

A student radio serviceman doing analysis work with modern and typical equipment. This is the same gear used by the average first-class radio shop that is doing precision servicing work.



The third floor of the building provides a radio code room for 50 men. Modern code transmission machines, typewriters, receivers, and special tables form an ideal unit for learning code work. Fifty U. S. Army men are training in high-speed code at the present time, with evening classes filled with civilians. A large classroom seating 40 men is located on this floor. A complete set of modern "lab" test instruments is stocked in this room, with several receivers built about circuit diagrams for demonstration work.

With a picture of the physical plant in



Beginning servicemen at work with receivers that have been built on a panel for demonstration. These receivers operate and may be studied as a circuit diagram or as a servicing problem. Note that the circuits may be broken by means of jacks for the insertion of meters for testing or observation of the effects of tuning, etc. These boards were built by advanced students.

mind, consider the program involved. Radio work can now be classified into three groups: radio servicing and repair, radio telephone operation, and radio telegraph operation. These "trade" radio courses do not include related radio work of any kind, such as the announcing and writing fields, amateur operation, or avocational servicing.

Basic to the three fields are the subjects that make up radio. "Math," physics, and electricity all must be mastered in an elementary form before a student is qualified to enter radio. A course called *Basic Radio* now is offered to all new radio men at the Gompers School. In this course the student not only gets an hour per day of radio physics, radio math, and radio electricity, but an hour each of circuit drafting and laboratory work. By giving a three-hour basic radio course to all students, it is possible to eliminate the unfit before they have wasted time and possibly done much damage to expensive instruments in the regular shop. An instructor is carefully picked for this course, with qualifications of a B.S. degree in electrical engineering, three years of servicing experience, and four years of broadcast experience.

Radio Servicing at Samuel Gompers is a one year course, following *Basic Radio.* A committee formed from industry, organized labor, and the radio staff formulate and constantly change the servicing course of study to bring it up to date. As students become proficient, and are capable of holding a learner's position, this same committee sponsors his entrance into the trade. Careful consideration is given to the first year of experience the student acquires. If the employer does not see fit to give the student a well-rounded service experience, pressure is brought to bear. No further learners are furnished to employers who do not wish to cooperate in this manner.

Radio operation of both telephone and telegraph equipment is covered by highly technical government examinations and rigid requirements of employment. Only the very best men can survive the course of instruction and examinations. Because of these facts, the best men from the basic radio classes are enlisted in operation classes. After completing examinations for government licenses, students are placed on a shift at KALW to gain operating experience. Jobs include control room work, studio duty, transmitter maintenance, recording, test bench and news work.

Upon successful completion of courses in radio operation, students are placed in commercial jobs through a committee from industry, labor, and school staff, in a manner similar to that used for radio service men.

It is felt that the new vocation, that of technical radio, is a far-reaching and permanent part of our vocational training program, and merits the respect and confidence of labor, industry, and government. In the present emergency we have been able, because of this program, to undertake the training of hundreds of Signal Corps men quickly and efficiently. After the emergency we hope to rehabilitate men to continue their work, and to help the entire field of radio to grow and be manned by capable, intelligent, and willing workers.

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Washington Letter

by Ben Brodinsky

"SUBSIDIZATION of trainees" is one of those official phrases which crop up first in off-the-record government conferences. Then it begins to show up in technical memoranda marked "Confidential." Finally, when officials believe that Congress and the people will react favorably, the phrase breaks out into the open.

In plain language, "subsidization" means that the federal government would pay trainees while they are taking free courses in critical occupations needed by war industry. It means that the government would provide transportation and housing, as well as wages during a trainee's period of instruction to induce him to stay in class. It is no secret that many training stations are not filled to capacity but cannot recruit applicants; there are too many job openings beckoning all around, even for unskilled workers.

Among the first to recommend officially—and publicly—that trainees be paid while enrolled in vocational courses is the Tolan Committee of the House of Representatives. It made its recommendations after extensive hearings of labor supply and training problems in both the United States and other countries. The Committee heard that in Great Britain, Germany, and Soviet Russia trainees have been subsidized for some time. In England, even dependents of trainees are aided by funds and other means. In the United States, too, the NYA and WPA programs provide pay for those who are in training. But these programs are too much wrapped up in the "relief" label. What the Tolan Committee has in mind is a large-scale subsidized training program to be directed by the Manpower Commission which would take away the stigma of relief for all those who need financial help while in training.

A growing number of Washington officials believe that "subsidization of trainees" is coming—sooner or later.

● The War for Survival is only a few months old, we have yet to launch a major attack, but its maimed are already hobbling about the streets, filling hospital wings, or sitting aimlessly in wheel chairs. Official Washington is already feeling pressure to do something about the veterans of this latest war.

The results of this pressure so far stand at five bills on vocational rehabilitation introduced in Congress; hearings on at least one of them (the measure introduced by Rep. Barden); considerable activity among state vocational rehabilitation directors; and a tug-of-war between the Veterans Administration and the Federal Security Agency for control. That we shall soon have a law extending vocational rehabilitation, together with new funds, is almost certain. The question is: Who will run the enlarged program?

● There is no doubt in the minds of many Washington observers that the Tolan Committee hearings influenced the transfer of the U. S. Employment Service, NYA, Training-Within-Industry, and the Apprenticeship Service to the War Manpower Commission. In a sense these transfers are only a double play from McNutt to McNutt. The agencies were already under Mr. McNutt as Federal Security Administrator and were transferred to him as Chairman of the Manpower Commission. Nevertheless, the move does centralize the recruiting agencies—and follows Tolan Committee views.

● Washington education leaders are hoping that the Employment Service will soon be able to take on another assignment—maintaining a Teacher Placement Service. Such a service was recommended by the National Education Association at its summer convention. Ever since then, NEA officials have been negotiating with the Employment Service to set the machinery in motion. To date—no results. Now comes the U. S. Office of Education Wartime Commission with an even more vigorous endorsement.

Says the Commission: "Despite the fact that there are 80 private- and more than 1000 college-operated teacher placement agencies, there are no placement services worthy of mention which operate on a Nation-wide basis. Existing means of facilitating the movement of teachers from areas of teacher surplus to areas of shortage are totally inadequate, and the country is rapidly approaching one of the most extensive and most damaging conditions of teacher shortage in its history."

● What shall a shop teacher do? Enlist in the armed forces, wait until he is called, or throw up teaching altogether for a job in industry? These questions are bothering many vocational and industrial arts teachers—and Washington officials know it.

The answers, if someone tries to give them, usually become wrapped up in double-talk about "patriotism" and "conscience." Here, however, is a composite of officialdom's reply, boiled down by your reporter:

Each man must make up his own mind.

In making his decision he must make winning the war—not personal advantage—his first consideration. (Officials say this is going to be a long war and a dead-earnest war; if we lose, we and our children are destined for slavery. This is not scare stuff, they say. Look at France and Poland).

Teachers as a group will not be deferred. Washington favors deferment on an individual basis only, depending on local manpower conditions and educational needs. At the same time, teachers should not hesitate to ask for deferment if they cannot be replaced.

Teachers should also request leaves of absence if they are "drafted" or should ask for other reemployment rights.

And finally, the teacher should understand that he may be more useful in winning the war in the classroom than in the Army or in war industry.

The shop bench is also a battle station; the lathe is also a weapon!

Index to Advertisers

Atlas Press Co. ---- 9
Boice Crane Co. ---- 15
Brandon Films ---- 18
Brodhead-Garrett Co. ---- 18
Casein Co. of America ---- 19
Comet Model Airplane & Supply Co. 18
Fountain Square Hotel ---- 21
Harper & Brothers ---- 21
Hotel Antlers ---- 14
Jefferson Machine Tool Co. ---- 10
Logan Engineering Co. ---- cover 2
Manual Arts Press ---- 23
McGraw-Hill Book Co. ---- 20
McKenna Metals Co. ---- 10
McKnight & McKnight ---- 21
Meissner Mfg. Co. ---- 17
Ohmite Mfg. Co. ---- 23
Plomb Tool Co. ---- 9
Racine Tool & Machine Co. ---- 21
Sheldon Machine Co. ---- 17
Skilsaw, Inc. ---- 2
South Bend Lathe Works ---- cover 3
Stanley Tools ---- 15
L. S. Starrett Co. ---- 15
Sugar Beets Products Co. ---- cover 4
John Wiley & Sons, Inc. ---- 19

HOW TO GET THE MOST OUT OF YOUR LATHES

No. 2 *in a series of suggestions made by the South Bend Lathe Works in the interest of more efficient war production.*

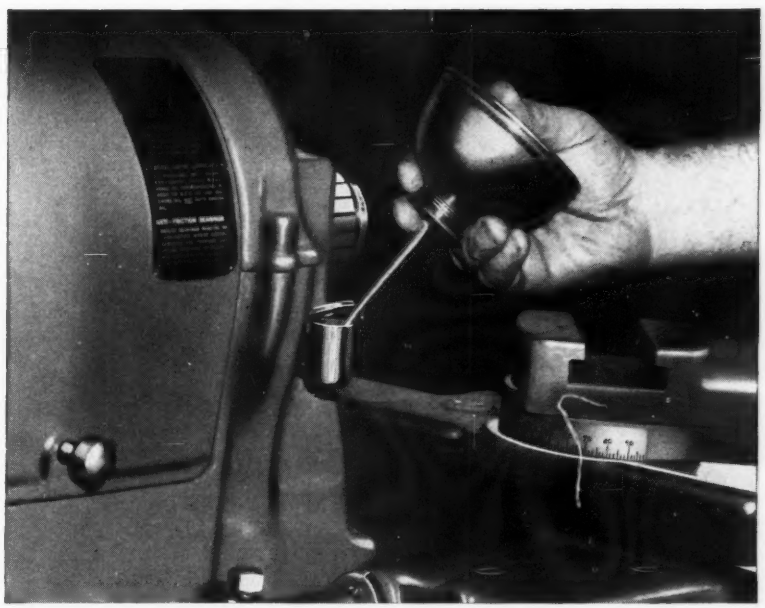
Keep Them Well Oiled

For lack of oil the bearing was lost;
For lack of a bearing the tank was lost;
For lack of a tank the battle was lost;
All for the lack of a film of oil.

Cleverly paraphrasing the ancient rhyme about the horseshoe nail, a young army officer is said to have used the above verse to emphasize the importance of lubrication in mechanized warfare. And this thought is just as applicable to the battle of production in American shops as it is to the tank battles in distant lands.

The proper lubrication of lathes and other machine tools will contribute much to our total war effort by preventing unnecessary interruption of production. It will also save scarce strategic materials and highly skilled technical labor by reducing to a minimum the demand for replacement bearings, parts, and machines.

South Bend Lathes, like other fine machine tools, have large oil reservoirs, felt wicks, and oil retainers to guard against lack of oil due to temporary neglect or oversight. But for best results the lathe should be oiled at regular intervals. Even a camel must have an occasional drink.



All bearings should be oiled at regular intervals

Make Oiling a Habit

All oil holes and oil cups on the lathe should be filled at least once a day — oftener when the lathe operates day and night — or when top speeds and feeds are employed. The best method is to fill each oil hole in a regular sequence so that oiling becomes a habit and no oil holes are overlooked. When the lathe is in service on two or more shifts, oiling the lathe should be the first daily task of each operator.

To help the inexperienced operator find the oil holes, a circle of brightly colored paint may be applied around each oil cup. Different colors of paint can be used to indicate different grades of oil.

Use Correct Grade of Oil

When the correct grade of oil is used in a well designed bearing there is little or no metal to metal contact and practically no wear. However, when the wrong grade of oil is used, or if the oiling is neglected, the oil film will break down and the fine finish of the bearing surface may be damaged in a short time.

The V-ways of the lathe bed, and the dovetails should be oiled as often as is necessary to maintain a good oil film. Touching the bed way with the tip of the finger will indicate whether or not it is coated with a film of oil.

Motors should be lubricated according to the motor manufacturer's instructions which are usually attached to the motor. Care should be taken to avoid getting oil on rubber V-belts or flat leather belts, as it is injurious to both.

Clean Lathe After Oiling

After the oiling has been completed, the excess of oil should be wiped off with a clean cloth. The lathe should be kept clean. Dirt, chips, or rust should not be allowed to collect.

Write for Bulletin No. H2

Bulletin No. H2 giving more complete information on oiling the lathe will be supplied on request. Oiling charts for South Bend Lathes, and reprints of this and other advertisements in this series can also be supplied. State quantity wanted, also serial numbers of lathes for which oiling charts are needed.

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